ENERGY USE ENGINEERING DEPARTMENT

ENERGY MANAGEMENT DIVISION

B.C. Hydro

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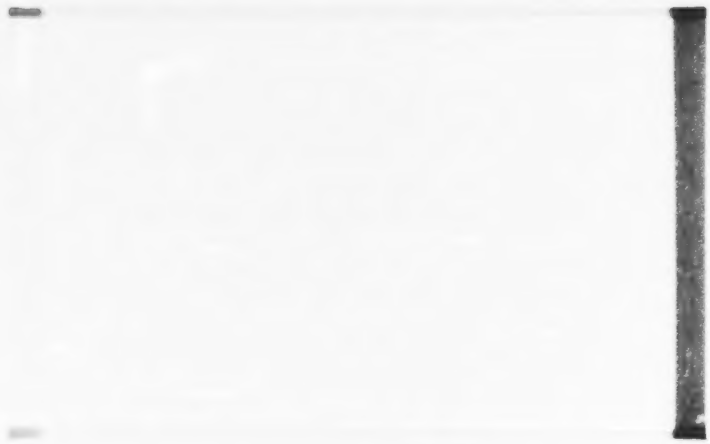

## ENERGY USE SERVICES

The Energy Use Engineering Department provides engineering, technical and marketing utilization-point information required for business planning, energy conservation, energy management, marketing and customer service activities.

Information includes electric and gas load characteristics, efficiencies, operating costs, performance and economies; usage trends, trade and industry practice, equipment availability and developing business opportunities; codes and standards; the potential impacts of energy management, alternative services and marketing activities; and customer needs, alternatives and preferences.

The service is provide by a team supervised as follows:

| | |
|---|---|
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| ***ELECTRICAL AND GAS TECHNOLOGIES AND ELECTRIC & GAS INDUSTRIAL APPLICATIONS** (including associated total-energy, district and waste energy applications; electric and gas vehicles, power factor and demand control) | **G.D.A. Henriques, P.Eng.** (663-3286) |
| ***RESIDENTIAL AND COMMERCIAL APPLICATONS CUSTOMER-OWNED ALTERNATE ENERGY SYSTEMS TECHNOLOGIES** (including associated appliances, lighting, wiring, water heating, electric and gas vehicles, solar, small hydro, wind, wood, and biomass) | **R.F. Hughes, P.Eng.** (663-3288) |

Please don't hesitate to contact us should you require additional information or should you have any suggestions on how we can better provide the service required.

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BUSINESS DEVELOPMENT GROUP

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PROJECT #8301

# OPTIONS FOR RESIDENTIAL FURNACE OIL-TO-ELECTRIC SPACE HEATING CONVERSIONS

SYNOPSIS:

Life cycle cost analysis indicates that all residential electric space heating options offer better economy than existing oil-fired systems. For homes with high heat loss (over 60,000 Btu/h), the heat pump provides the greatest potential for energy savings, as well as supplying cooling in summer. The electric plenum heater/oil furnace hybrid system will normally have the lowest installed cost. Electric baseboard heaters are usually the most economical system for homes with low heating requirements. Load shedding offers a means of avoiding the cost of electrical service ugrading for many installations.

PROJECT:

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| Completed by: | H. M. Lau, P.Eng./H. Jackman CET |
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ENERGY USE ENGINEERING DEPARTMENT

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| ASSIGNED TO: | Z. El-Ramly | ASSIGNED BY: | R. W. Racine |
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OBJECTIVES AND NOTES:

BACKGROUND

Early conversion of the many residential oil fired forced warm air systems to one or more of the many electric space heating options offers opportunities for beneficial new revenues from the electric system in B.C. Hydro's Integrated Service Area - and opportunities for energy savings, modernization and energy conservation for the customers involved.

Experience has shown that success will be governed by customer acceptance, that is, how well the customer's interests will be served in terms of operating costs, comfort, building modernization, future service and replacement costs and re-wiring, energy availability and protection against inflation.

Develop a pros and cons analysis including relative economics as in H309 for the main options now technically available to customers covering oil-electric duct heaters using the existing oil system; new electric furnaces; heat pumps and baseboards; improved weatherization and off-oil grants, etc. as discussed.

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R. Van Schilt

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APPENDIX II SAMPLE LIFE CYCLE COST TABLES
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# OPTIONS FOR RESIDENTIAL

# OIL TO ELECTRIC SPACE HEATING CONVERSIONS

## 1. SUMMARY

The options to the residential customer for oil to electric conversion of space heating systems include baseboard, forced warm air, forced hot water (hydronic) and heat pump systems. The heat pump system may be installed as an all-electric package or as an add-on to an existing oil furnace. The electric baseboard, forced air and hydronic systems may be installed as total electric systems or as add-ons to existing oil-fired systems, to form an electric/oil hybrid system. Where load monitoring equipment is included with hybrid systems, no service upgrading is necessary for electrical services of 100A or greater.

When converting the heating system from oil to electric or hybrid, the customer can take the opportunity to modernize his heating system with energy conserving controls. The upgrading of building insulation and glazing is another option open to the conversion customer. Financial assistance is available to qualifying customers, for insulation upgrade, through the Federal Government's CHIP program available until March 1986, and through B. C. Hydro's loan program.

Life cycle cost analysis indicates that all electric space heating options for off-oil conversion offer better economy than the existing oil-fired system. For homes with heat loss in excess of 60,000 Btu/h and with higher heating energy requirements, the heat pump provides the greatest potential for energy savings, and additionally provides summer air conditioning.

Electric plenum heaters installed in oil furnaces as electric/oil hybrid heating systems are currently undergoing field test and evaluation, as are heat pump systems. Preliminary results indicate that with plenum heater hybrid systems, annual heating cost savings of up to 20 percent can be realized. Some complaints concerning the slower morning pickup were readily satisfied by installing a two-stage thermostat to activate the oil mode for faster morning pickup. However, this strategy results in lower savings. It should be noted that the life expectancy of these hybrid systems is restricted to the life of the oil furnace.

Preliminary results from the heat pump evaluation indicate reductions in space heating energy in the order of 2.5 to 1 as compared to the oil furnace.

Electric infrared (radiant) heating systems are not considered viable for retrofit in existing buildings.

## 2. RECOMMENDATIONS

From the many options available to the oil-to-electric conversion customer, we recommend the following systems:

### 2.1 Forced Warm Air

Where oil-fired forced warm air systems exist, the customer may readily convert to electricity by replacing his oil-fired furnace with an electric furnace. In many cases, electrical service upgrading may be necessary, and a small alteration to supply and return air plenums will usually be required to accommodate the smaller dimensions of the electric furnace. All other components of the system remain unchanged.

### 2.2 Heat Pump

For residences with heat losses in excess of 60,000 Btu/h, the installation of a heat pump system offers the greatest opportunity for cost saving, and affords the additional benefit of summer air conditioning.

### 2.3 Electric Plenum Heater

Where installed cost is the primary consideration, the installation of an electric plenum heater in the existing oil furnace, to form an electric/oil hybrid heating system, offers the lowest installed cost of all oil-to-electric conversion options. This is primarily due to the fact that no expensive service upgrading is necessary.

### 2.4 Hydronic Heating

Where hot water heating systems exist, the homeowner can readily covert to electric heating by replacing his oil-fired boiler with an electric boiler and upgrading his electrical service where necessary.

### 2.5 Electric/Oil Hybrid Hydronic System

Where service upgrading costs are prohibitive, the customer may install an electric boiler in parallel with his oil-fired boiler, to perform up to 80 percent of his space heating requirement, and include load shedding capability. This will reduce his installation costs, as no service upgrading will be necessary.

### 2.6 Electric Baseboard

Where practical, the installation of an electric baseboard system to replace the existing oil-fired heating system, will provide a high degree of comfort and economical operation, as each room or area will be controlled by its own thermostat.

### 2.7 Electric Infrared Heating

Infrared (radiant) heating systems are not recommended for retrofit in existing homes as an off-oil conversion option.

## 3. INTRODUCTION

With the conversion of his residential oil-fired space heating systems to one or more of the available electric heating options, the customer can benefit from the opportunities afforded him for savings in energy costs, and for modernization, while taking advantage of the financial assistance offered through Federal Government grants. He has the option of converting to an all-electric system utilizing either resistance baseboards, hydronic or forced warm air heating, or to an add-on system in conjunction with his existing oil-fired system, to form a hybrid electric/oil system. In many such cases, where load shedding equipment is included in the conversion installation, no costly service upgrading will be required.

For B. C. Hydro, early conversion of the many residential oil-fired space heating systems offers opportunities for beneficial new revenues from the electric system in the Integrated Service Area. Only electric heating has been discussed in this report. Where natural gas is available, it will normally be the first consideration for off-oil conversion.

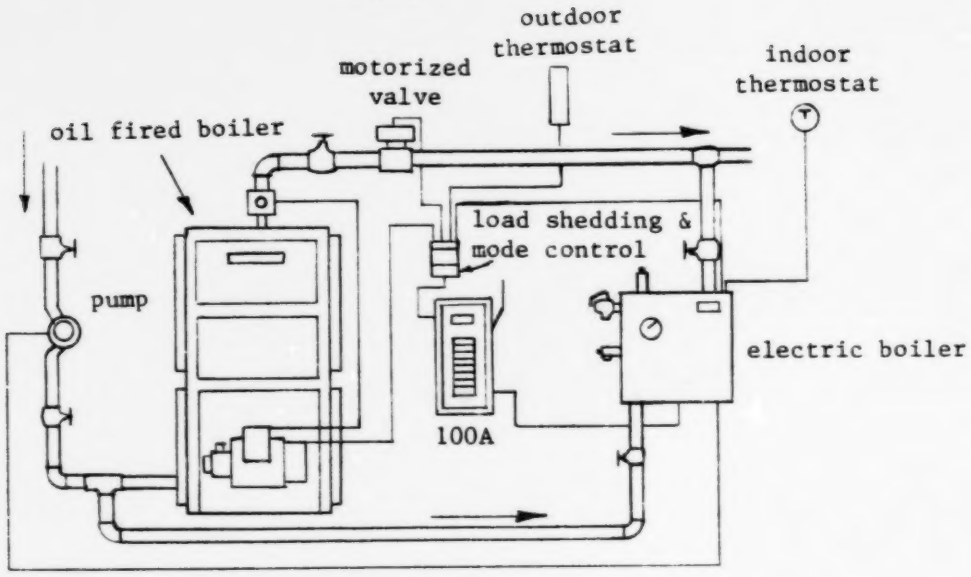
## 4. ELECTRIC SPACE HEATING OPTIONS

Existing residential oil-fired heating systems are normally either hydronic (forced or gravity hot water) or forced warm air. Gravity hot water systems are now obsolete, but may be encountered in a few older dwellings. Where the life expectancy of the building makes it viable, the gravity system should be converted to a forced hot water system if conversion to electric hydronic heating is planned.

### 4.1 Hydronic System Conversion

Oil-fired hydronic heating systems may be readily converted to electric heating by one of two methods. The first method involves the replacement of the oil-fired boiler with an electric boiler. The electric boiler must be sized to maintain indoor temperatures at 22°C at outside design temperature and the conversion will probably require a new correctly sized circulating pump. However, the house electrical service must first be checked to ensure there is sufficient capacity for the additional space heating load. Where 100 amp services exist, there is usually additional capacity available for up to 8 kilowatts. If insufficient capacity is available, the service must first be upgraded.

With an all-electric hydronic heating system the customer can realize annual space heating cost savings up to 20% compared to oil heating costs.




Hybrid Hydronic System

The second method involves the installation of an electric boiler in parallel with the existing oil-fired boiler, sized to the limit of available capacity of the electrical service to form a hybrid electric/oil heating system, or sized to perform about 75% of the space heating with load shedding control installed. In this hybrid system, the electric boiler is the primary heat source, and the oil-fired boiler is automatically selected by the control board whenever the smaller electric boiler is unable to maintain indoor comfort due to low outdoor temperatures. A minimum service size of 100A is required for this type of system, and where the added space heating load includes load shedding, this control monitors total house electric load and drops off the electric space heating load as the total house electric load approaches 80% of total service capacity. The installation of load shedding avoids the necessity and additional cost of service upgrading.

Where service upgrading is required, additional costs of $750 to $1,200 may be expected. For further information on hydronic heating see B. C. Hydro Data Sheet H 530.

There may be cases where the homeowner may wish to dispose of his hydronic system completely and retrofit a complete electric baseboard system. Except where a 200A electrical service exists, this will normally require expensive service upgrading, and compared to a new baseboard installation, labour costs for the retrofit system will be considerably higher.

## 4.2 Forced Warm Air Conversion

Several electric heating options exist for the homes which have existing oil-fired forced warm air systems. The homeowners choice will largely depend on considerations of retrofit installation costs, degree of disruption to existing construction and whether service upgrading is required.

4.2.1 Forced Warm Air Furnace

This is probably the most acceptable type of heater to the off-oil conversion customer. It directly replaces the oil-fired furnace and is reconnected to existing ductwork, leaving the customer with little evidence of change. For many installations, however, an expensive service upgrading may be required. Where 100 amp electrical services exist, there is normally only available extra capacity for eight additional kilowatts.

Data Sheet E 1600 contains helpful information on forced warm air heating systems. Installation costs for a retrofit electric furnace are in the order of $1,500, provided service upgrading is not required.

Combination wood/electric furnaces are available, and where there is a convenient low cost supply of wood, these offer opportunities for savings in heating costs and conservation of electrical energy. As with all-electric furnaces, they are connected to existing ductwork. However, they are larger than electric furnaces and sometimes occupy more floor space than residential oil furnaces. It is essential that these furnaces be vented into a Class A vent or masonry chimney. In addition, the clearances of the supply air duct from combustible material are greater for solid fuel burning appliances. This will probably necessitate modifications to the existing ductwork.

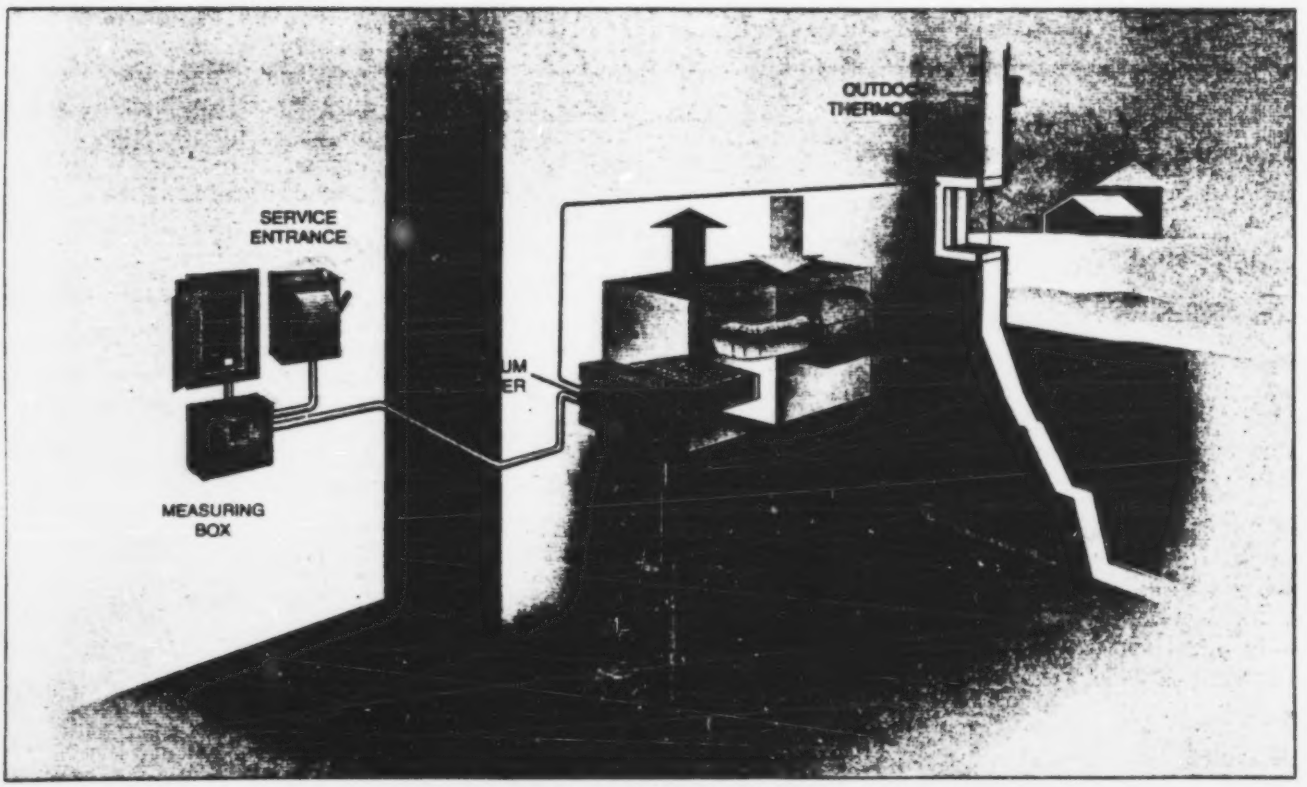
Combination Wood/
Electric Furnace

4.2.2 Electric Plenum Heater

These are installed in the plenum of an existing forced warm air heating system, and utilize the existing blower and distribution ducts. They may be sized to provide all or part of the heating requirement, with the oil burner furnishing the balance of the heating requirement in the latter case. For homes with a 100 amp electrical service, there is usually available capacity to accommodate the addition of a plenum heater of up to 8 kW capacity, but for heaters of larger capacity, service upgrading to 200 amps will be required, except where load shedding and load monitoring equipment are included in the installation.

A particular feature of electric plenum heaters that homeowners should be aware of is the lower temperature supply air, as compared to an oil-fired furnace. This sometimes leads to premature complaints of inadequate heat from a properly designed and installed system.

The installed cost of a hybrid system utilizing a 9 kW plenum heater will be in the order of $1,500, including load shedding, but not service upgrading.




Electric/Oil Hybrid Heating System

Where plenum heaters provide only part of the heating requirement, there is no seasonal increase of electrical load during peak winter conditions, since the peak heating requirement is provided by oil.

Plenum heaters currently undergoing field test and evaluation by Energy Use Engineering Department, (Project 8307) feature load shedding capability. This feature permits the installation of up to 15 kW plenum heaters where a 100 amp electrical service exists, provided that there is a main switch or breaker installed. However, for most homes, a maximum heater input of 9 kW is recommended for hybrid electric/oil installations. This will normally provide comfort heating for 80% or more of the year, which will secure savings in heating costs in the order of 10-20%. During the most severe weather conditions, space heating will be provided by the oil furnace.

A further disadvantage where larger input plenum heaters are installed in an electric/oil hybrid system is that when the oil mode is activated after many hours, even days, of low outdoor temperatures, the chimney or vent inner surface temperature could be below the dew point of the flue gases, resulting in condensation of an acidic nature on the inner chimney surfaces. This can cause corrosion, accelerated deterioration of chimney liners, spalling and potential blockage of flues or vents. In the case of plenum heaters up to a maximum of 9 kW, the oil mode will normally be activated before such severe weather conditions exist.

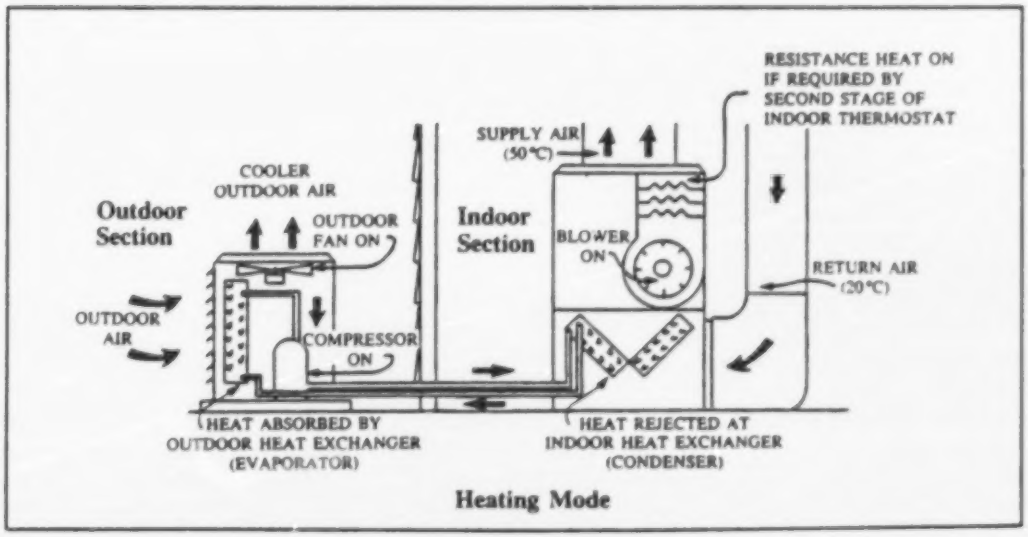
Probably the most effective method of preventing chimney condensation in hybrid heating systems would be to operate the system in the oil mode, say from 4:00 p.m. to 6:00 p.m. daily. This would effectively dry out and warm inner chimney surfaces, while decreasing electric energy demand during a daily peak period. It would, however, reduce the annual savings in heating costs.

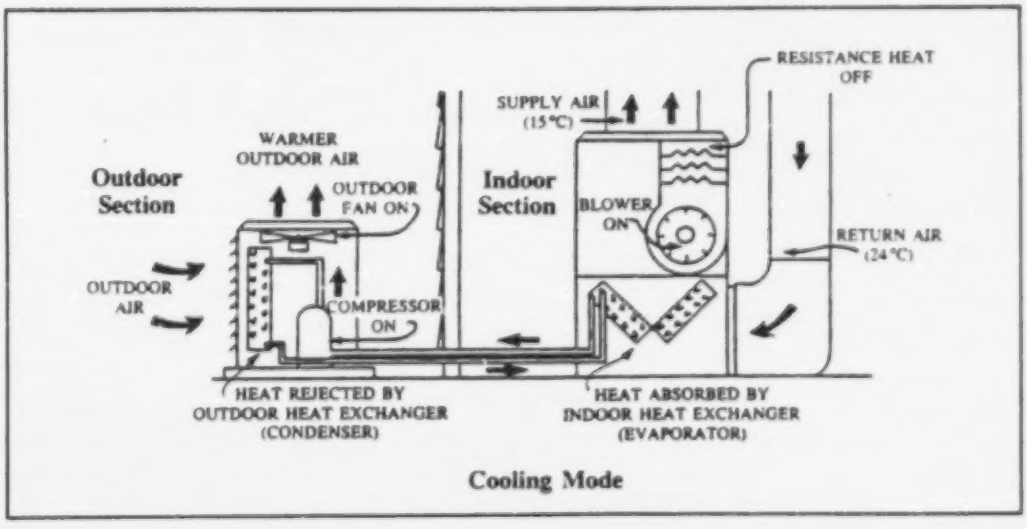
For detailed information on electric plenum heaters see Data Sheet E 1611.

4.2.3 Electric Heat Pump

The all-electric heat pump may be used to replace an existing forced warm air furnace, or a hybrid heat pump may be installed in conjunction with the existing warm air system. The existing distribution ducts are utilized in both cases.

The heat pump is a device which uses the same principles as the domestic refrigerator. It extracts heat from a source at low temperature and discharges it at a higher temperature. The low temperature heat source may be the outside air, earth or lake, river or well water. This transfer of heat allows a heat pump to supply more heat than the equivalent energy supplied to the heat pump. See Data Sheet E 1800 for more complete details on heat pump operation and installation.



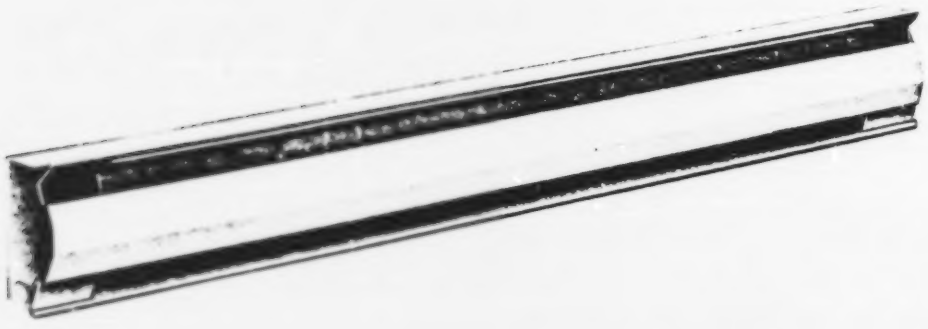

All Electric Split System Heat Pump

A heat pump may also be installed as an add-on to an existing forced warm air furnace and operated as a hybrid heating system. Add-on heat pumps are less expensive than complete systems and are particularly attractive for persons who are considering conversion from an oil-fired system. The add-on heat pump uses the existing furnace blower and ductwork, and may not require electrical service upgrading since it does not require electric resistance heating backup. They also provide the advantage of summer air conditioning and are therefore beneficial to B. C. Hydro's base load.

Before proceeding with the installation of an add-on heat pump, the existing oil furnace should be carefully inspected to ensure it is in good condition and proper working order. The ductwork must also be checked as it may limit the size of heat pump which can be installed without changing the ductwork. Installed cost of the heat pump system will be in the order of $3,500 to $4,500. Heating energy costs are normally up to 40% less than for an oil-fired system, but maintenance costs will be higher than for other retrofit systems.

4.2.4 Baseboard

This is the most popular of electric heaters because of its low cost and its simplicity of installation. Baseboard heaters readily lend themselves to retrofit installations as they are surface mounted, and the wiring can be easily concealed. Heating elements are available in 120, 208 and 240 volts. Compared to a central forced warm air system, a baseboard heating system usually provides savings in energy, and added comfort because each room or area heated is controlled by separate thermostat.

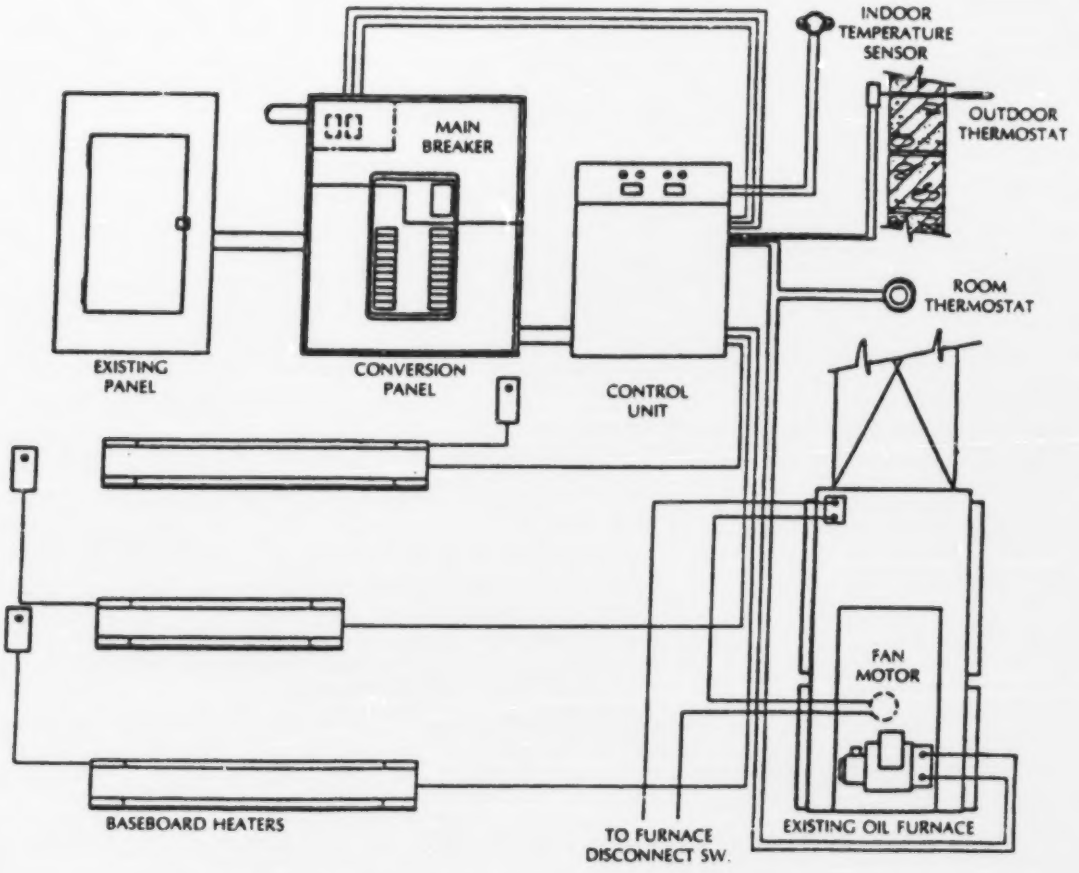


Electric Baseboard Heater

Baseboard heaters can be retrofitted to form an electric/ oil hybrid heating system, using the existing oil furnace as the alternative heating mode which is then selected by an outdoor preset thermostat. Retrofit baseboard heating installations usually cost considerably more than new installations due to the additional labour involved, and therefore may not be a practical option in many cases.

Expensive service upgrading can usually be avoided by including load monitoring and shedding with the retrofit installation. Total house current is monitored and when this approaches 80% of total service capacity, the load shedding device will drop off space heating load, usually one heating circuit at a time.

Where the cost of load shedding may equal or approach the cost of service upgrading, the latter is the preferred option. Data Sheet E 1500 provides more complete information on electric baseboard heating.




Retrofit Baseboard System With Load Shedding

4.2.5 Infrared (Radiant) Heating)

Electric infrared heating is not considered a viable option for oil-to-electric conversion due to the difficult and costly retrofit involved. Radiant ceiling, ceiling panel and wall panel systems may be considered for add-on rooms or areas, however, and where no spare electrical service capacity is available, service upgrading will be necessary. See Data Sheet E2000 for complete information on electric infrared heating.

## 5. ADDITIONAL SAVING OPPORTUNITIES WITH ELECTRIC HEATING

Further opportunities for cost reduction are presented to the customer who is planning oil-to-electric conversion. The first consideration should be to upgrade house insulation and glazing. Federal insulation grants are available to qualifying homeowners until March 1986, and a further advantage is derived from insulation upgrading as the house heat loss is reduced, resulting in smaller heating equipment requirements and lower installation and operating costs. The CEA Double E insulation guidelines indicate the national minimum requirements for comfort and economy. B. C. Hydro recommended insulation levels (Data Sheet H206) will provide even greater long-term economy.

On Vancouver Island, where many residential heat pumps have been installed, Seasonal Performance Factors (SPF) as high as 1.8 to 2.1 have been achieved. This realizes a saving in energy costs of approximately 50% over other conventional electric heating systems. Where super-insulated homes exist, all-electric heating may be viable even where natural gas is available, considering the service charge for a gas account.

Provided that a convenient, free or low cost supply of wood is available, the installation of a combination wood/electric furnace or boiler will conserve electric energy and secure savings in heating costs for the off-oil conversion customer. This type of furnace, which requires a Class A vent or masonry chimney, can be vented into the existing chimney which serves the oil-burning appliance. However, the chimney should first be carefully inspected for deterioration or damage to the mortar, brick and liner, and repaired or replaced as necessary.

For B. C. Hydro, the installation of combination wood/electric furnaces and add-on plenum heaters (where the oil furnace is retained), affords the opportunity for peak load shedding.

## 6. CUSTOMER BENEFITS

The benefits accruing to the customer from oil to electric conversion are many. For resistance type heaters (baseboards, furnaces, plenum heaters, etc.), energy costs favour electricity

over oil by approximately 20 to 25 percent. With heat pumps, and combination wood/electric furnace installations where low cost wood is available, a further saving in heating costs may be realized. All-Electric heaters make no contribution to outdoor air pollution. The individual room control of a baseboard system provides increased comfort over a central oil heating system, and a heat pump installation provides, at low energy cost, the additional comfort of summer air conditioning.

While modernizing his home with the installation of an electric heating system, the opportunity exists for the customer to realize further savings in energy costs by adding time controls for automatic night setback of room temperature, and to upgrade his building insulation, with the assistance of a grant under the CHIP program for qualified homeowners. Upgrading the insulation will result in a lower building heat loss, reduced heating equipment requirements and lower heating costs. The reduction of heating equipment requirement may also permit the customer to avoid upgrading his electrical service.

Except for heat pump installations, the cost of maintenance or replacement would be minimal, as electric resistance heaters have a life expectancy in the order of 35 years.

It should be noted, however, that in some older homes, the customer who wishes to install an electric heating system may be faced with re-wiring costs and many homes may require an upgraded electric service to accommodate the added load of full electric heating.

### 6.1 Customer Satisfaction

Successful marketing of electric heating requires correct sizing and proper installation. These can be assured by:

Sizing: From heat losses calculated from B. C. Hydro's Electric Field Manual, HRAIC's Manual J, or by using the advisory services offered by B. C. Hydro computer programs H10 and H15, survey forms for which are available from Advisory Services. (See Appendix I for samples.)

Installation: Insulate to the recommendations of Double E guidelines, utilize CSA Performance Certified equipment where available and good, efficient controls.

## 7. LIFE CYCLE COST ANALYSIS

Life cycle cost analysis is a common method used for the economic evaluation of the various heating systems. The analysis considers such factors as fuel costs, inflation rate, interest rate, fuel escalation rate, capital cost, maintenance charges, replacement and depreciation values over the lifetime of equipment.

A computer program has been developed by Energy Use Engineering to evaluate the various off-oil conversion options. The results are tabulated in Appendix II. The electric plenum add-on heater/oil furnace option life cycle cost analysis has been included. It is an economically viable option since the existing electric service need not be upgraded. This could save up to $1,200 in capital cost. The annual fuel cost will be slightly higher than the electric furnace. This is due to the use of oil during severe cold weather and/or during morning pickup.

The sample life cycle cost analysis included in Appendix II indicates that for homeowners whose houses are not that well insulated (House A in the tables), the first choice for conversion should be the electric heat pump. Heat pumps have the greatest potential for energy savings when the heating requirement is high, the potential varying inversely as the insulation value. When installed cost of the oil-to-electric conversion alone is considered, the add-on electric plenum heater hybrid system has the lowest installed cost. This is primarily due to the fact that electric service upgrading is not necessary in this case.

For houses with higher insulation levels, or where insulation is being upgraded to the equivalent of House B in the tables, the first choice for off-oil conversion should be to electric baseboard (where practicable) in Lower Mainland and Vancouver Island regions. In other regions of the province, there is still a slight advantage in favour of the heat pump. The electric plenum heater/oil hybrid system will still have the lowest installed cost of all oil to electric conversion options. When payback period alone is considered (see Appendix III for sample computer output), the electric plenum heater/oil hybrid system will usually offer the quickest payback, in the order of five years in the Lower Mainland and three years in the Central Interior Region. Retrofit baseboard and heat pump systems offer payback periods of six years in the Lower Mainland, and four years in the Central Interior. However, it is more logical to consider life cycle cost comparison.

## 8. CONCLUSIONS

Early conversion of residential oil-fired space heating systems to one or more of the available electric heating options offers benefits to the customer and the utility.

The customer can benefit from savings in energy costs and the opportunity to modernize his heating system and upgrade his home insulation, while taking advantage of available federal government grants. He may choose to convert to a modern all-electric heating system, or to a hybrid system such as an electric plenum heater/oil furnace system. Such systems usually involve a minimum of disruption or change to the existing system, while providing the advantage of backup heating should either mode become inoperative. He may also choose a heat pump system with its added benefit of summer air conditioning.

Electric infrared (radiant) systems are not considered viable for oil-to-electric conversion, due to the difficulty and high cost of retrofit installation.

For B. C. Hydro, the installation of residential hybrid electric/oil systems benefits base load, and also provides the opportunity for peak load shedding. Conversion of the many residential oil-fired space heating systems to all-electric or hybrid systems will provide beneficial new revenues from the electrical system in the Integrated Service Area.

REFERENCED DATA SHEETS

| | |
|---|---|
| H 530 | Hydronic Heating |
| E 1500 | Electric Baseboard Heating |
| E 1600 | Residential Forced Warm Air Heating |
| E 1611 | Electric Plenum Heaters |
| E 1800 | Heat Pumps |
| E 2000 | Electric Infrared Heating |

# APPENDIX I

## SAMPLE ROOM-BY-ROOM HEAT LOSS ANALYSIS

# B.C. HYDRO ELECTRIC SPACE HEATING ADVICE QUESTIONNAIRE
# ROOM-BY-ROOM ANALYSIS

Your response to this questionnaire will allow us to provide you with a room-by-room heat loss analysis of your home, guidance on room-by-room sizing of your electric equipment, and an estimate of your space heating consumption. Please send the completed form to your local B.C. Hydro office, or to B.C. Hydro, Energy Use Engineering Department, 1265 Howe Street, Vancouver, B.C. V6Z 2G8. Your reply will be mailed to you.

(Please Print)
LAST NAME: _____ INITIAL: _____ Location # (refer to Table 3): _____
ADDRESS: No.: _____ STREET NAME: _____ AVE., ST., ETC.: _____
CITY: _____ POSTAL CODE: _____
TELEPHONE No. (if desired): _____

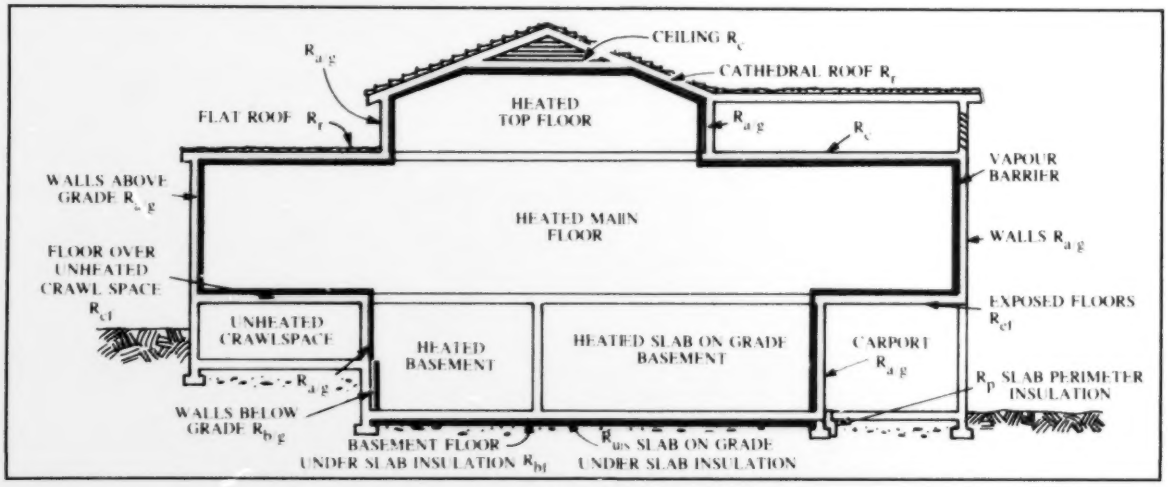



**Figure 1 Location of Home Insulation**

Symbols ($R_{a/g}$, $R_c$, etc.) are for cross reference to Insulation Values in Section A. Refer to Table 2 for guidance on insulation values.

| A. GENERAL BUILDING DATA<br>Enter wherever applicable | | | | | | REMARKS |
|---|---|---|---|---|---|---|
| 1. Most Common Ceiling Height: | | Feet | or | Metres | | Choose Preferred Units Then Use Consistently Throughout Input Form. |
| Insulation Values — | | R | or | RSI | | |
| 2. Ceiling: | $R_c$ | | | | | |
| 3. Roof: | $R_r$ | | | | | |
| 4. a) Exterior Above Grade Wall: | $R_{a/g}$ | | | | | |
| b) Exterior Below Grade Wall: | $R_{b/g}$ | | | | | |
| 5. Exterior Floors that are — | | R | or | RSI | Type | |
| a) Exposed Floor: | $R_{ef}$ | | | | 1 | Use These Floor Types in Section B Question 5. |
| b) Floor Over Unheated Crawlspace: | $R_{cf}$ | | | | 2 | |
| c) Basement Floor: Under Slab: | $R_{bf}$ | | | | 3 | |
| d) Unheated Slab-on-Grade: Under Slab: | $R_{us}$ | | | | 4 | |
| Perimeter: | $R_p$ | | | | | |
| e) Heated Slab-on-Grade: Under Slab: | $R_{us}$ | | | | 5 | |
| Perimeter: | $R_p$ | | | | | |
| | | | | Type | | |
| 6. The Majority of Windows and Glass Doors are — | | | | | | Select Type from Table 1. |
| 7. The Majority of Exterior Doors are — | | | | | | |
| 8. The Majority of Skylights are — | | | | | | |
| 9. Air Infiltration Rate: | | (Air Changes per Hour) | | | AC/H | Enter if known. |
| 10. Air-to-Air Heat Exchanger: | | (Y or N) | | | | |
| Effectiveness: | | | | | % | |
| 11. Soil Type: **A.** Well-drained sandy-soil **B.** Wet Clay | | (A or B) | | | | |

## B. ROOM DETAILS

Enter Gross Area wherever applicable. Enter in shaded boxes only if different from Section A. Units to be consistent with Section A.

| Room Name: | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Room Dimensions: | Area | Height | Area | Height | Area | Height | Area | Height | Area | Height | Area | Height |
| 2. Exposed Ceilings: | Area | R/RSI | Area | R/RSI | Area | R/RSI | Area | R/RSI | Area | R/RSI | Area | R/RSI |
| 3. Roof: | | | | | | | | | | | | |
| 4. Exterior Walls a) Above Grade: | | | | | | | | | | | | |
| b) Below Grade: | | | | | | | | | | | | |
| 5. Exterior Floors | Area | Type | Area | Type | Area | Type | Area | Type | Area | Type | Area | Type |
| a) Majority: | | | | | | | | | | | | |
| b) Other: | | | | | | | | | | | | |
| 6. Windows a) Majority: | | | | | | | | | | | | |
| b) Other: | | | | | | | | | | | | |
| 7. Exterior Doors: | | | | | | | | | | | | |
| 8. Skylights: | | | | | | | | | | | | |

| Room Name: | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Room Dimensions: | Area | Height | Area | Height | Area | Height | Area | Height | Area | Height | Area | Height |
| 2. Exposed Ceilings: | Area | R/RSI | Area | R/RSI | Area | R/RSI | Area | R/RSI | Area | R/RSI | Area | R/RSI |
| 3. Roof: | | | | | | | | | | | | |
| 4. Exterior Walls a) Above Grade: | | | | | | | | | | | | |
| b) Below Grade: | | | | | | | | | | | | |
| 5. Exterior Floors | Area | Type | Area | Type | Area | Type | Area | Type | Area | Type | Area | Type |
| a) Majority: | | | | | | | | | | | | |
| b) Other: | | | | | | | | | | | | |
| 6. Windows a) Majority: | | | | | | | | | | | | |
| b) Other: | | | | | | | | | | | | |
| 7. Exterior Doors: | | | | | | | | | | | | |
| 8. Skylights: | | | | | | | | | | | | |

| Room Name: | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Room Dimensions: | Area | Height | Area | Height | Area | Height | Area | Height | Area | Height | Area | Height |
| 2. Exposed Ceilings: | Area | R/RSI | Area | R/RSI | Area | R/RSI | Area | R/RSI | Area | R/RSI | Area | R/RSI |
| 3. Roof: | | | | | | | | | | | | |
| 4. Exterior Walls a) Above Grade: | | | | | | | | | | | | |
| b) Below Grade: | | | | | | | | | | | | |
| 5. Exterior Floors | Area | Type | Area | Type | Area | Type | Area | Type | Area | Type | Area | Type |
| a) Majority: | | | | | | | | | | | | |
| b) Other: | | | | | | | | | | | | |
| 6. Windows a) Majority: | | | | | | | | | | | | |
| b) Other: | | | | | | | | | | | | |
| 7. Exterior Doors: | | | | | | | | | | | | |
| 8. Skylights: | | | | | | | | | | | | |

## B. ROOM DETAILS — continued

| Room Name: | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Room Dimensions: | Area | Height | Area | Height | Area | Height | Area | Height | Area | Height | Area | Height |
| | | | | | | | | | | | | |
| 2. Exposed Ceilings: | Area | R/RSI | Area | R/RSI | Area | R/RSI | Area | R/RSI | Area | R/RSI | Area | R/RSI |
| | | | | | | | | | | | | |
| 3. *Roof* | | | | | | | | | | | | |
| 4. Exterior Walls a) Above Grade: | | | | | | | | | | | | |
| b) Below Grade: | | | | | | | | | | | | |
| 5. Exterior Floors | Area | Type | Area | Type | Area | Type | Area | Type | Area | Type | Area | Type |
| a) Majority: | | | | | | | | | | | | |
| b) Other: | | | | | | | | | | | | |
| 6. Windows a) Majority: | | | | | | | | | | | | |
| b) Other: | | | | | | | | | | | | |
| 7. Exterior Doors: | | | | | | | | | | | | |
| 8. Skylights: | | | | | | | | | | | | |

## C. REFERENCE TABLES

### Table 1
### Window, Door, and Skylight Types

| WINDOW TYPE | Single Glazed | Single Glazed W/Storm | Double Glazed | Triple Glazed | Quadruple Glazed |
|---|---|---|---|---|---|
| **Metal Framed** | | | | | |
| Single Glazed | 1 | 2 | — | — | — |
| ¼" Air Space | — | — | 3 | 4 | 5 |
| ½" Air Space | — | — | 6 | 7 | 8 |
| ½" Air Space-(with thermal) break) | — | — | 9 | 10 | 11 |
| **Wood Framed** | | | | | |
| Single Glazed | 12 | 13 | — | — | — |
| ¼" Air Space | — | — | 14 | 15 | 16 |
| ½" Air Space | — | — | 17 | 18 | 19 |
| **Vinyl Framed** | | | | | |
| ¼" Air Space | — | — | 20 | — | — |
| ½" Air Space | — | — | 21 | 22 | — |

| DOOR TYPE | Without Storm Door | With Storm Door |
|---|---|---|
| **Wood** | | |
| 1½" Solid | 1 | 2 |
| 2" Solid | 3 | 4 |
| 1½" Panel | 5 | 6 |
| 2" Panel | 7 | 8 |
| **Steel** (Core Filled) | | |
| Mineral Fibre | 9 | — |
| Polyurethane | 10 | — |
| Polystyrene | 11 | — |

| SKYLIGHT TYPE | Single Glazed | Single Glazed W/Storm | Double Glazed |
|---|---|---|---|
| **Metal Framed** | | | |
| Single Glazed | 1 | 2 | — |
| ¼" Air Space | — | — | 3 |
| ½" Air Space | — | — | 4 |
| ½" Air Space-(with thermal break) | — | — | 5 |
| **Wood Framed** | | | |
| Single Glazed | 6 | 7 | — |
| ¼" Air Space | — | — | 8 |
| ½" Air Space | — | — | 9 |

Note: Select the appropriate window, door, and skylight types. For Section A and B typical single door area is 21 sq. ft. or 2 $m^2$ approx.

### Table 2
### What Does "R" and "RSI" Stand For

Insulation performance is measured by "R" or "RSI" values. **The higher the "R" or "RSI" value the more efficient the insulation.** The following chart shows the different types of insulation and the "R" or "RSI" value for their approximate thickness.

| INSULATION MATERIAL | APPROXIMATE THICKNESS OF INSULATION FOR "R" AND "RSI" VALUES NOTED | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | R7 | R10 | R12 | R20 | R28 | R34 | R40 | R48 |
| | RSI 1.2 | RSI 1.8 | RSI 2.1 | RSI 3.5 | RSI 4.9 | RSI 6.0 | RSI 7.0 | RSI 8.4 |
| Fibreglass, Rock Wool Batts | 2½" | 3½" | 3½" | 6" | 9" | 10¼" | 12" | 16" |
| Poured Fibreglass, Blown Rock Wool | 2¼" | 3" | 3¾" | 6" | 9" | 10¼" | 12" | 16" |
| Blown Fibreglass | 2½" | 3½" | 4¼" | 7" | 9¾" | 11¾" | 13⅜" | 17" |
| Expanded Mica, Wood Shavings | 3" | 4½" | 5½" | 9" | 12¾" | 15½" | 18" | 22" |
| Rigid Fibreglass, Expanded Polystyrene | 1¾" | 2½" | 3" | 5" | 7" | 8½" | 10" | 12" |
| Extruded Polystyrene | 1½" | 2" | 2½" | 4" | 5¾" | 6¾" | 8" | 10" |
| Poured Cellulose Fibre | 2" | 2⅜" | 3¼" | 5½" | 7⅜" | 9¼" | 12" | 14" |
| Blown Cellulose Fibre — Applied Thickness | 2¾" | 3½" | 4½" | 7¼" | 10½" | 12¼" | 15" | 18" |
| — Settled Thickness | 2¼" | 3" | 3½" | 6" | 8½" | 10¼" | 12" | 15" |
| Polyurethane Foam | 1¼" | 1¾" | 2" | 3¼" | 4½" | 5¾" | 6¾" | 8" |

**Table 3**
**Location Number for Major B.C. Cities**

Choose the location closest to your city:

| City | Location # | City | Location # | City | Location # | City | Location # |
|---|---|---|---|---|---|---|---|
| Vancouver | 1 | Crescent Valley | 37 | Kitimat | 74 | Prince Rupert | 111 |
| Victoria | 2 | Creston | 38 | Ladner | 75 | Princeton | 112 |
| Prince George | 3 | Clofton | 39 | Langley | 76 | Qualicum Beach | 113 |
| Vernon | 4 | Cultus Lake | 40 | Lardeau | 77 | Quesnel | 114 |
| Terrace | 5 | Cumberland | 41 | Lillooet | 78 | Revelstoke | 115 |
| | | Dawson Creek | 42 | Lumby | 79 | Richmond | 116 |
| Abbotsford | 6 | Denman Island | 43 | Lytton | 80 | Rossland | 117 |
| Agassiz | 7 | Dog Creek | 44 | McBride | 81 | Salmon Arm | 118 |
| Aldergrove | 8 | Duncan | 45 | MacKenzie | 82 | Saltspring Island | 119 |
| Alert Bay | 9 | Elko | 46 | McLeod Lake | 83 | Sandspit | 120 |
| Alta Lake | 10 | Enderby | 47 | Massett | 84 | Sayward | 121 |
| Armstrong | 11 | Fernie | 48 | Merritt | 85 | Sechelt | 122 |
| Ashcroft | 12 | Fort Nelson | 49 | Mission | 86 | Shalalth | 123 |
| Bamfield East | 13 | Fort St. James | 50 | Montrose | 87 | Shawnigan Lake | 124 |
| Barkerville | 14 | Fort St. John | 51 | Nakusp | 88 | Sicamous | 125 |
| Barriere | 15 | Fraser Lake | 52 | Nanaimo | 89 | Sidney | 126 |
| Bella Coola | 16 | Ganges | 53 | Nelson | 90 | Smithers | 127 |
| Blue River | 17 | Gibsons | 54 | New Denver | 91 | Smith River | 128 |
| Bralorne | 18 | Glacier | 55 | New Hazelton | 92 | South Slocan | 129 |
| Bby Simon Fraser Univ | 19 | Gold River | 56 | New Westminster | 93 | Sparwood | 130 |
| Burns Lake | 20 | Golden | 57 | North Vancouver | 94 | Squamish | 131 |
| Cache Creek | 21 | Grand Forks | 58 | Ocean Falls | 95 | Stewart | 132 |
| Campbell River | 22 | Grassy Plains | 59 | Oliver | 96 | Summerland | 133 |
| Carmi | 23 | Greenwood | 60 | 100 Mile House | 97 | Surrey | 134 |
| Cassiar | 24 | Gulf Islands | 61 | 150 Mile House | 98 | Taylor | 135 |
| Castlegar | 25 | Haney | 62 | Osoyoos | 99 | Telkwa | 136 |
| Chase | 26 | Hedley | 63 | Parksville | 100 | Tofino | 137 |
| Chetwynd | 27 | Hope | 64 | Peachland | 101 | Trail | 138 |
| Chilliwack | 28 | Hudson Hope | 65 | Pemberton | 102 | Ucluelet | 139 |
| Clearwater | 29 | Invermere | 66 | Penticton | 103 | Valemount | 140 |
| Cloverdale | 30 | Jordan River | 67 | Port Alberni | 104 | Vanderhoof | 141 |
| Comox | 31 | Kamloops | 68 | Port Alice | 105 | Vavenby | 142 |
| Coquitlam Lake | 32 | Kaslo | 69 | Port Clements | 106 | Warfield | 143 |
| Courtenay | 33 | Kelowna | 70 | Port Hardy | 107 | White Rock | 144 |
| Cowichan Bay | 34 | Kemano | 71 | Port Kells | 108 | Williams Lake | 145 |
| Cowichan Lake | 35 | Keremeos | 72 | Port McNeill | 109 | Youbou | 146 |
| Cranbrook | 36 | Kimberley | 73 | Powell River | 110 | | |

## INSTALLATIONS

The information provided herein is a guide only. B.C. Hydro is not responsible for installations. These should meet the current requirements of the owner, manufacturer's instructions and all applicable codes, standards and regulations.

## ADVISORY INFORMATION

Advisory information on electric and gas applications, relative costs, efficient use and energy management is available to the trades and all interested B.C. Hydro industrial, commercial and residential customers. Contact your local B.C. Hydro office or the Energy Use Engineering Department, 1265 Howe Street, Vancouver, B.C. V6Z 2G8. In the Lower Mainland, call 298-2411 and ask for Advisory Services.

**1985 MARCH: TKWL/GJ**
energy use engineering department

energy management division
B.C. Hydro

71992

## ROOM-BY-ROOM SIZING FOR ELECTRIC HEATING

## ROOM-BY-ROOM SUMMARY

For the home of: John Doe
123 Some Street
Certain City A1B 2C3

Dear Sir/Madame:

The following estimates are based on your supplied information. Additional estimates based on CEA Double E guidelines and B.C. Hydro insulation recommendations are also available.

| Reference Location | Celsius Degree Days | Outdoor Design Temp. | Total Floor Area |
|---|---|---|---|
| Vancouver | 3031 | -7°C | 2152 ft² |

| ROOM No. | ROOM DESCRIPTION | AREA ft² | CLG. HEIGHT ft | HEAT LOSS Btu/h | HEAT LOSS Watts | TYPICAL HEATER SIZE Watts |
|---|---|---|---|---|---|---|
| 1 | Entry | 156 | 16.0 | 5246 | 1537 | 2000 |
| 2 | Living | 344 | 8.0 | 5754 | 1686 | 2000 |
| 3 | Dining | 182 | 8.0 | 3285 | 963 | 1250 |
| 4 | Kitchen | 208 | 8.0 | 2642 | 774 | 1000 |
| 5 | Family | 228 | 8.0 | 3798 | 1113 | 1250 |
| 6 | Laundry | 156 | 8.0 | 2571 | 754 | 1000 |
| 7 | Powder | 60 | 8.0 | 371 | 109 | 300 |
| 8 | Changing | 47 | 8.0 | 498 | 146 | 300 |
| 9 | Ensuite | 138 | 8.0 | 1641 | 481 | 750 |
| 10 | Master Bedroom | 336 | 8.0 | 4950 | 1451 | 1750 |
| 11 | Bedroom No.2 | 121 | 8.0 | 1757 | 515 | 750 |
| 12 | Bedroom No.3 | 121 | 8.0 | 1757 | 515 | 750 |
| 13 | Bath | 55 | 8.0 | 785 | 230 | 300 |

### SUMMARY TABLE

| | | |
|---|---|---|
| Total Space Heating Equipment Capacity | = | 13.4 kW |
| Est. Yearly Electrical Space Heating Consumption | = | 8530 kWh |
| Est. Yearly Electrical Space Heating Cost ( .0431$/kWh) | = | $ 370 |

Notes:
1. Heat loss is based on an indoor design temperature of 22°C (72°F). Space heating equipment sizing includes an allowance for space temperature pickup.
2. Yearly electrical space heating consumption and cost are for maintaining an indoor space temperature of 21°C (70°F) 24 hr/day in all rooms during a normal year.
3. Actual energy cost will vary with individual living habits. Higher space temperature settings will result in higher energy costs. Lower space temperature settings and/or temperature set-back will result in lower energy costs. (See data sheet EC 200 for details.)
4. Low voltage thermostats are recommended for closer space temperature control and comfort.
5. Your contractor should size the space heating equipment based on your actual house dimensions and construction.

As a minimum, B.C. Hydro recommends insulation levels that meet the CEA Double E guidelines for comfort and economy. For greater long-term economy, use B.C. Hydro recommended insulation levels.

The information provided herein is a guide only. B.C. Hydro is not responsible for sizing and/or installations. For additional information contact your local B.C. Hydro office.

13-May-85
Energy Use Engineering Department

Energy Management Division
B.C. Hydro

## ROOM-BY-ROOM SIZING FOR ELECTRIC HEATING

## DETAILED HEAT LOSS

For the home at [illegible] Lot
[illegible] Stone Street
Certain Lot, Alr 207

| Reference Location | Celsius Degree Days | Outdoor Design Temp. | Total Floor Area |
|---|---|---|---|
| Vancouver | 3021 | -7°C | 2192 ft² |

| ROOM No. | ROOM DESCRIPTION | COMPONENT HEAT LOSS | A Value | U Value | AREA ft² | HEAT LOSS Btu/h | HEAT LOSS Watts |
|---|---|---|---|---|---|---|---|
| 1 | Entry | Exposed Ceilings (net) | 24 | .020 | 156 | 244 | 72 |
| | | Exterior A/S Walls (net) | 20 | .061 | 127 | 427 | 114 |
| | | Heated Slab Floors | 7/ 5 | .048 | 156 | 287 | 112 |
| | | Windows-Metal,1/2 in.double | | .550 | 23 | 1271 | 486 |
| | | Doors-Wood,2 in,solid | n/a | .320 | 20 | 861 | 252 |
| | | Infiltration = .75( AC/H, 10.0 ft clg.ht.. | | | 156 | 1754 | 515 |
| | | **Room Heat Loss =** | **1537 Watts** | | **Heater Size =** | **2000 Watts** | |
| 2 | Living | Exterior A/S Walls (net) | 20 | .061 | 204 | 536 | 214 |
| | | Heated Slab Floors | 7/ 5 | .020 | 432 | 840 | 348 |
| | | Exposed Floors | 20 | .021 | 44 | 84 | 24 |
| | | Windows-Metal,1/2 in.double | | .550 | 71 | 2187 | 641 |
| | | Infiltration = .75( AC/H, 8.0 ft clg.ht.. | | | 344 | 1974 | 568 |
| | | **Room Heat Loss =** | **1686 Watts** | | **Heater Size =** | **2000 Watts** | |
| 3 | Dining | Exterior A/S Walls (net) | 20 | .061 | 211 | 675 | 198 |
| | | Heated Slab Floors | 7/ 5 | .050 | 182 | 455 | 134 |
| | | Windows-Metal,1/2 in.double | | .550 | 36 | 1106 | 324 |
| | | Infiltration = .75( AC/H, 8.0 ft clg.ht.. | | | 182 | 1026 | 301 |
| | | **Room Heat Loss =** | **963 Watts** | | **Heater Size =** | **1250 Watts** | |
| 4 | Kitchen | Exterior A/S Walls (net) | 20 | .061 | 121 | 417 | 122 |
| | | Heated Slab Floors | 7/ 5 | .044 | 248 | 498 | 146 |
| | | Windows-Metal,1/2 in.double | | .590 | 10 | 554 | 162 |
| | | Infiltration = .75( AC/H, 8.0 ft clg.ht.. | | | 248 | 1172 | 344 |
| | | **Room Heat Loss =** | **774 Watts** | | **Heater Size =** | **1000 Watts** | |
| 5 | Family | Exterior A/S Walls (net) | 20 | .061 | 224 | 809 | 237 |
| | | Heated Slab Floors | 7/ 5 | .059 | 248 | 592 | 174 |
| | | Windows-Metal,1/2 in.double | | .590 | 36 | 1109 | 325 |
| | | Infiltration = .75( AC/H, 8.0 ft clg.ht.. | | | 220 | 1285 | 377 |
| | | **Room Heat Loss =** | **1113 Watts** | | **Heater Size =** | **1250 Watts** | |
| 6 | Laundry | Exterior A/S Walls (net) | 20 | .061 | 210 | 869 | 170 |
| | | Heated Slab Floors | 7/ 5 | .050 | 124 | 427 | 118 |
| | | Windows-Metal,1/2 in.double | | .590 | 6 | 616 | 181 |
| | | Infiltration = .75( AC/H, 8.0 ft clg.ht.. | | | 154 | 879 | 258 |
| | | **Room Heat Loss =** | **754 Watts** | | **Heater Size =** | **1000 Watts** | |
| 7 | Powder | Heated Slab Floors | 7/ 5 | .011 | 60 | 32 | 10 |
| | | Infiltration = .75( AC/H, 8.0 ft clg.ht.. | | | 60 | 328 | 96 |
| | | **Room Heat Loss =** | **109 Watts** | | **Heater Size =** | **300 Watts** | |
| 8 | Changing | Exposed Ceilings (net) | 24 | .030 | 47 | 74 | 22 |
| | | Exterior A/S Walls (net) | 20 | .061 | 50 | 159 | 47 |
| | | Infiltration = .75( AC/H, 8.0 ft clg.ht.. | | | 47 | 265 | 78 |
| | | **Room Heat Loss =** | **146 Watts** | | **Heater Size =** | **300 Watts** | |
| 9 | Ensuite | Exposed Ceilings (net) | 24 | .030 | 138 | 216 | 63 |
| | | Exterior A/S Walls (net) | 20 | .061 | 92 | 440 | 84 |
| | | Windows-Metal,1/2 in.double | | .590 | 10 | 554 | 162 |
| | | Infiltration = .75( AC/H, 8.0 ft clg.ht.. | | | 138 | 770 | 226 |
| | | **Room Heat Loss =** | **481 Watts** | | **Heater Size =** | **750 Watts** | |
| 10 | Master Bedroom | Exposed Ceilings (net) | 24 | .030 | 330 | 529 | 154 |
| | | Exterior A/S Walls (net) | 20 | .061 | 260 | 958 | 281 |
| | | Windows-Metal,1/2 in.double | | .590 | 51 | 1551 | 460 |
| | | Infiltration = .75( AC/H, 8.0 ft clg.ht.. | | | 330 | 1894 | 555 |
| | | **Room Heat Loss =** | **1451 Watts** | | **Heater Size =** | **1750 Watts** | |
| 11 | Bedroom No.2 | Exposed Ceilings (net) | 24 | .030 | 121 | 189 | 56 |
| | | Exterior A/S Walls (net) | 20 | .061 | 104 | 331 | 97 |
| | | Windows-Metal,1/2 in.double | | .590 | 10 | 554 | 162 |
| | | Infiltration = .75( AC/H, 8.0 ft clg.ht.. | | | 121 | 682 | 200 |
| | | **Room Heat Loss =** | **515 Watts** | | **Heater Size =** | **750 Watts** | |
| 12 | Bedroom No.3 | Exposed Ceilings (net) | 24 | .030 | 121 | 189 | 56 |
| | | Exterior A/S Walls (net) | 20 | .061 | 104 | 331 | 97 |
| | | Windows-Metal,1/2 in.double | | .590 | 10 | 554 | 162 |
| | | Infiltration = .75( AC/H, 8.0 ft clg.ht.. | | | 121 | 682 | 200 |
| | | **Room Heat Loss =** | **515 Watts** | | **Heater Size =** | **750 Watts** | |
| 13 | Bath | Exposed Ceilings (net) | 24 | .030 | 55 | 86 | 25 |
| | | Exterior A/S Walls (net) | 20 | .061 | 64 | 204 | 60 |
| | | Windows-Metal,1/2 in.double | | .590 | 6 | 185 | 54 |
| | | Infiltration = .75( AC/H, 8.0 ft clg.ht.. | | | 55 | 310 | 91 |
| | | **Room Heat Loss =** | **230 Watts** | | **Heater Size =** | **300 Watts** | |

### SUMMARY TABLE

| | |
|---|---|
| Total Space Heating Equipment Capacity | = 13.4 kW |
| Estimated Yearly Electrical Space Heating Consumption | = 6250 kWh |
| Estimated Yearly Electrical Space Heating Cost (.04¢/kWh) | = $ 370 |

### SUPER DOUBLE E/R-2000 PROGRAM ENERGY BUDGET

| | |
|---|---|
| CEA Super Double E/R-2000 Space Heating Energy Budget Allowance | = 2540 kWh |
| This home does not meet the above space heating energy budget. | |

The information provided herein is a guide only. B.C. Hydro is not responsible for sizing and/or installations. For additional information, contact your local B.C. Hydro office.

13-May-85
Energy Use Engineering Department

Energy Management Division
B.C. Hydro

# APPENDIX II

## SAMPLE LIFE CYCLE COST TABLES

# COMPARATIVE LIFE CYCLE COSTING FOR RESIDENTIAL ELECTRIC AND OIL SPACE HEATING SYSTEMS

Different heating systems have different operating costs, it is due to the difference in burning efficiency of gas, oil and electricity heating equipment and fuel costs. Therefore, when selecting the most economical heating system for a home, not only the initial installation cost, but also the system operating and maintenance costs should be considered.

There are a number of methods available to arrive at an optimal system selection. One of the most commonly used is the Life Cycle Costing (LCC) technique, which examines the economics (e.g., first cost, operating and maintenance costs, interest rate, etc.) of the heating systems for the duration of the period studied. The most economical selection (or the optimal) would be the one with the lowest life cycle cost.

This data sheet uses the LCC technique to analyze the economics of different oil and electric heating systems for the three typical houses in each of the five regions as indicated in data sheet H338. (Refer to data sheet H340 for analysis of gas/oil space heating systems.)

The analysis is based on the following parameters,

1. Annual fuel escalation rate : Oil - 12%, Electricity - 12%,
2. Annual inflation rate : 5%,
3. Annual interest rate : 10%,
4. Equipment salvage value : 5%,
5. Period of study : 25 years.

The typical houses in data sheet H338 are 110 sq. meter (1200 sq. ft.) single storey dwellings with heated basement and have the following insulation levels,

House A - RSI 1.2 (R7) Ceiling, RSI 1.2 (R7) Walls, RSI 1.2 (R7) Below Grade Walls, Single Glazed Windows (Double Glazed in the Interior and North Coast Regions),

House B - RSI 3.5 (R20) Ceiling, RSI 2.1 (R12) Walls, RSI 2.1 (R12) Below Grade Walls, Double Glazed Windows,

House C - RSI 7.0 (R40) Ceiling, RSI 3.5 (R20) Walls, RSI 2.1 (R12) Below Grade Walls, thermally broken Double Glazed Windows.

## LOCATION : LOWER MAINLAND

## HOUSE A - EXISTING HOME WITH TYPICAL PRE-1976 INSULATION

| | Electric Baseboard Heater | Electric Central Furnace | Electric Heat Pump | Oil Furnace W/ Add-On Elec. Plenum Heater | | Conventional Oil Furnace | Intermediate Oil Furnace |
|---|---|---|---|---|---|---|---|
| ENERGY CONSUMPTION | kW.h | kW.h | kW.h | kW.h | Litres | Litres | Litres |
| Annual fuel use | 23805 | 24382 | 13715 | 18286 | 846 | 4305 | 3643 |
| Equivalent kW.h | 23805 | 24382 | 13715 | 27449 | | 46628 | 39457 |
| 25 - year fuel use (MW.h) | 595 | 610 | 343 | 686 | | 1166 | 986 |
| Relative energy consumption % | 100 | 102 | 58 | 115 | | 196 | 166 |
| ENERGY COST | | | | | | | |
| Current annual fuel cost ($) | 1026 | 1051 | 591 | 1077 | | 1472 | 1246 |
| Projected 25 - year fuel cost ($) | 136801 | 140134 | 78800 | 143601 | | 196267 | 166134 |
| Relative energy cost % | 100 | 102 | 58 | 105 | | 143 | 121 |
| EQUIPMENT COST | | | | | | | |
| Equipment life (years) | 25 | 20 | 15 | 15 | | 15 | 15 |
| Current equip. replacement cost ($) | 1300 | 800 | 3200 | 1500 | | 1000 | 1700 |
| 25 - YEAR LIFE CYCLE COST | | | | | | | |
| Estimated equip. installed cost ($)* | 2100 | 2300 | 4800 | 1500 | | 1000 | 1700 |
| Service and maintenance cost ($) | 70 | 200 | 1700 | 1200 | | 1050 | 1100 |
| Equip. replacement Present Value ($) | 0 | 166 | 1376 | 645 | | 430 | 731 |
| 25 yrs fuel cost Present Value ($) | 32695 | 33491 | 18833 | 34320 | | 46907 | 39705 |
| Total 25 - year Life Cycle Cost ($) | 34865 | 36158 | 26709 | 37665 | | 49387 | 43236 |
| Relative Life Cycle Cost % | 100 | 104 | 77 | 108 | | 142 | 124 |

* Note: Cost indicated is for equip. replacement only, and it includes elect. panel upgrade cost for the full electric systems. The COSP grant is not included in the estimate. The Electric Plenum Heater is assumed to displace 75% of oil.

## HOUSE B - TYPICAL CURRENT NEW HOME

| | Electric Baseboard Heater | Electric Central Furnace | Electric Heat Pump | Oil Furnace * W/ Add-On Elec. Plenum Heater | | Conventional Oil Furnace | Intermediate Oil Furnace |
|---|---|---|---|---|---|---|---|
| ENERGY CONSUMPTION | kW.h | kW.h | kW.h | kW.h | Litres | Litres | Litres |
| Annual fuel use | 10823 | 11086 | 6236 | 8314 | 381 | 1939 | 1641 |
| Equivalent kW.h | 10823 | 11086 | 6236 | 12441 | | 21001 | 17774 |
| 25 - year fuel use (MW.h) | 271 | 277 | 156 | 311 | | 525 | 444 |
| Relative energy consumption % | 100 | 102 | 58 | 115 | | 194 | 164 |
| ENERGY COST | | | | | | | |
| Current annual fuel cost ($) | 466 | 478 | 269 | 488 | | 663 | 561 |
| Projected 25 - year fuel cost ($) | 62134 | 63734 | 35867 | 65067 | | 88400 | 74800 |
| Relative energy cost % | 100 | 103 | 58 | 105 | | 142 | 120 |
| EQUIPMENT COST | | | | | | | |
| Equipment life (years) | 25 | 20 | 15 | 15 | | 15 | 15 |
| Current equip. replacement cost ($) | 1300 | 800 | 3100 | 1400 | | 1000 | 1700 |
| 25 - YEAR LIFE CYCLE COST | | | | | | | |
| Estimated system installed cost ($) | 1600 | 2500 | 5600 | 1400 | | 2400 | 3000 |
| Service and maintenance cost ($) | 70 | 200 | 1700 | 1200 | | 1050 | 1100 |
| Equip. replacement Present Value ($) | 0 | 166 | 1333 | 602 | | 430 | 731 |
| 25 yrs fuel cost Present Value ($) | 14850 | 15232 | 8572 | 15551 | | 21127 | 17877 |
| Total 25 - year Life Cycle Cost ($) | 16520 | 18098 | 17205 | 18753 | | 25007 | 22708 |
| Relative Life Cycle Cost % | 100 | 110 | 104 | 114 | | 151 | 137 |

* Note: Not a practical option for new constructions, indicated here for Oil Conversion purposes only (75% oil displacement is assumed).

## HOUSE C - CEA DOUBLE E HOME

| | Electric Baseboard Heater | Electric Central Furnace | Electric Heat Pump | Oil Furnace * W/ Add-On Elec. Plenum Heater | | Conventional Oil Furnace | Intermediate Oil Furnace |
|---|---|---|---|---|---|---|---|
| ENERGY CONSUMPTION | kW.h | kW.h | kW.h | kW.h | Litres | Litres | Litres |
| Annual fuel use | 6712 | 6875 | 3867 | | | 1053 | 891 |
| Equivalent kW.h | 6712 | 6875 | 3867 | N/A | | 11405 | 9650 |
| 25 - year fuel use (MW.h) | 168 | 172 | 97 | | | 285 | 241 |
| Relative energy consumption % | 100 | 102 | 58 | | | 170 | 144 |
| ENERGY COST | | | | | | | |
| Current annual fuel cost ($) | 289 | 296 | 167 | | | 360 | 305 |
| Projected 25 - year fuel cost ($) | 38534 | 39467 | 22267 | N/A | | 48000 | 40667 |
| Relative energy cost % | 100 | 102 | 58 | | | 125 | 106 |
| EQUIPMENT COST | | | | | | | |
| Equipment life (years) | 25 | 20 | 15 | | | 15 | 15 |
| Current equip. replacement cost ($) | 1200 | 800 | 3000 | N/A | | 900 | 1500 |
| 25 - YEAR LIFE CYCLE COST | | | | | | | |
| Estimated system installed cost ($) | 1500 | 2100 | 5400 | | | 2300 | 2800 |
| Service and maintenance cost ($) | 70 | 200 | 1700 | | | 1050 | 1100 |
| Equip. replacement Present Value ($) | 0 | 166 | 1290 | N/A | | 387 | 645 |
| 25 yrs fuel cost Present Value ($) | 9209 | 9432 | 5322 | | | 11472 | 9719 |
| Total 25 - year Life Cycle Cost ($) | 10779 | 11899 | 13712 | | | 15209 | 14264 |
| Relative Life Cycle Cost % | 100 | 110 | 127 | N/A | | 141 | 132 |

* Note: Not Applicable for new constructions.

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Energy Use Engineering Department

Energy Management Division
B.C. Hydro

# COMPARATIVE LIFE CYCLE COSTING
# FOR RESIDENTIAL ELECTRIC AND OIL SPACE HEATING SYSTEMS

Different heating systems have different operating costs, it is due to the difference in burning efficiency of gas, oil and electricity heating equipment and fuel costs. Therefore, when selecting the most economical heating system for a home, not only the initial installation cost, but also the system operating and maintenance costs should be considered.

There are a number of methods available to arrive at an optimal system selection. One of the most commonly used is the Life Cycle Costing (LCC) technique, which examines the economics (e.g., first cost, operating and maintenance costs, interest rate, etc.) of the heating systems for the duration of the period studied. The most economical selection (or the optimal) would be the one with the lowest life cycle cost.

This data sheet uses the LCC technique to analyze the economics of different oil and electric heating systems for the three typical houses in each of the five regions as indicated in data sheet H338. (Refer to data sheet H340 for analysis of gas/oil space heating systems.)

The analysis is based on the followings parameters,

1. Annual fuel escalation rate : Oil - 12%, Electricity - 12%,
2. Annual inflation rate : 5%,
3. Annual interest rate : 10%,
4. Equipment salvage value : 5%,
5. Period of study : 25 years.

The typical houses in data sheet H338 are 110 sq. meter (1200 sq. ft.) single storey dwellings with heated basement and have the followins insulation levels,

House A - RSI 1.2 (R7) Ceiling, RSI 1.2 (R7) Walls, RSI 1.2 (R7) Below Grade Walls, Single Glazed Windows (Double Glazed in the Interior and North Coast Regions),

House B - RSI 3.5 (R20) Ceiling, RSI 2.1 (R12) Walls, RSI 2.1 (R12) Below Grade Walls, Double Glazed Windows,

House C - RSI 7.0 (R40) Ceiling, RSI 3.5 (R20) Walls, RSI 2.1 (R12) Below Grade Walls, thermally broken Double Glazed Windows.

## LOCATION : VANCOUVER ISLAND

## HOUSE A - EXISTING HOME WITH TYPICAL PRE-1976 INSULATION

| | Electric Baseboard Heater | Electric Central Furnace | Electric Heat Pump | Oil Furnace W/ Add-On Elec. Plenum Heater | | Conventional Oil Furnace | Intermediate Oil Furnace |
|---|---|---|---|---|---|---|---|
| ENERGY CONSUMPTION | kW.h | kW.h | kW.h | kW.h | Litres | Litres | Litres |
| Annual fuel use | 23317 | 24018 | 13510 | 18013 | 834 | 4244 | 3591 |
| Equivalent kW.h | 23317 | 24018 | 13510 | 27046 | | 45967 | 38894 |
| 25 - year fuel use (MW.h) | 583 | 600 | 338 | 676 | | 1149 | 972 |
| Relative energy consumption % | 100 | 103 | 58 | 116 | | 197 | 167 |
| ENERGY COST | | | | | | | |
| Current annual fuel cost ($) | 1005 | 1035 | 582 | 1066 | | 1475 | 1248 |
| Projected 25 - year fuel cost ($) | 134001 | 138001 | 77600 | 142134 | | 196667 | 166401 |
| Relative energy cost % | 100 | 103 | 58 | 106 | | 147 | 124 |
| EQUIPMENT COST | | | | | | | |
| Equipment life (years) | 25 | 20 | 15 | 15 | | 15 | 15 |
| Current equip. replacement cost ($) | 1300 | 800 | 3200 | 1500 | | 1000 | 1700 |
| 25 - YEAR LIFE CYCLE COST | | | | | | | |
| Estimated equip. installed cost ($)* | 2000 | 2250 | 4800 | 1500 | | 1000 | 1700 |
| Service and maintenance cost ($) | 70 | 200 | 1700 | 1200 | | 1050 | 1100 |
| Equip. replacement Present Value ($) | 0 | 166 | 1376 | 645 | | 430 | 731 |
| 25 yrs fuel cost Present Value ($) | 32025 | 32981 | 18546 | 33969 | | 47003 | 39769 |
| Total 25 - year Life Cycle Cost ($) | 34095 | 35598 | 26423 | 37315 | | 49483 | 43300 |
| Relative Life Cycle Cost % | 100 | 104 | 77 | 109 | | 145 | 127 |

* Note: Cost indicated is for equip. replacement only, and it includes elect. panel upgrade cost for the full electric systems. The CDSP grant is not included in the estimate. The Electric Plenum Heater is assumed to displace 75% of oil.

## HOUSE B - TYPICAL CURRENT NEW HOME

| | Electric Baseboard Heater | Electric Central Furnace | Electric Heat Pump | Oil Furnace * W/ Add-On Elec. Plenum Heater | | Conventional Oil Furnace | Intermediate Oil Furnace |
|---|---|---|---|---|---|---|---|
| ENERGY CONSUMPTION | kW.h | kW.h | kW.h | kW.h | Litres | Litres | Litres |
| Annual fuel use | 10131 | 10435 | 5870 | 7826 | 361 | 1835 | 1553 |
| Equivalent kW.h | 10131 | 10435 | 5870 | 11736 | | 19875 | 16821 |
| 25 - year fuel use (MW.h) | 253 | 261 | 147 | 293 | | 497 | 421 |
| Relative energy consumption % | 100 | 103 | 58 | 116 | | 196 | 166 |
| ENERGY COST | | | | | | | |
| Current annual fuel cost ($) | 437 | 450 | 253 | 462 | | 638 | 540 |
| Projected 25 - year fuel cost ($) | 58267 | 60000 | 33734 | 61600 | | 85067 | 72000 |
| Relative energy cost % | 100 | 103 | 58 | 106 | | 146 | 124 |
| EQUIPMENT COST | | | | | | | |
| Equipment life (years) | 25 | 20 | 15 | 15 | | 15 | 15 |
| Current equip. replacement cost ($) | 1300 | 800 | 3100 | 1400 | | 1000 | 1700 |
| 25 - YEAR LIFE CYCLE COST | | | | | | | |
| Estimated system installed cost ($) | 1600 | 2600 | 5600 | 1400 | | 2400 | 3000 |
| Service and maintenance cost ($) | 70 | 200 | 1700 | 1200 | | 1050 | 1100 |
| Equip. replacement Present Value ($) | 0 | 166 | 1333 | 602 | | 430 | 731 |
| 25 yrs fuel cost Present Value ($) | 13926 | 14340 | 8062 | 14722 | | 20331 | 17208 |
| Total 25 - year Life Cycle Cost ($) | 15596 | 17306 | 16696 | 17924 | | 24211 | 22039 |
| Relative Life Cycle Cost % | 100 | 111 | 107 | 115 | | 155 | 141 |

* Note: Not a practical option for new constructions, indicated here for Oil Conversion purposes only (75% oil displacement is assumed).

## HOUSE C - CEA DOUBLE E HOME

| | Electric Baseboard Heater | Electric Central Furnace | Electric Heat Pump | Oil Furnace * W/ Add-On Elec. Plenum Heater | | Conventional Oil Furnace | Intermediate Oil Furnace |
|---|---|---|---|---|---|---|---|
| ENERGY CONSUMPTION | kW.h | kW.h | kW.h | kW.h | Litres | Litres | Litres |
| Annual fuel use | 6201 | 6387 | 3593 | | | 969 | 820 |
| Equivalent kW.h | 6201 | 6387 | 3593 | N/A | | 10495 | 8881 |
| 25 - year fuel use (MW.h) | 155 | 160 | 90 | | | 262 | 222 |
| Relative energy consumption % | 100 | 103 | 58 | | | 169 | 143 |
| ENERGY COST | | | | | | | |
| Current annual fuel cost ($) | 267 | 276 | 155 | | | 337 | 285 |
| Projected 25 - year fuel cost ($) | 35600 | 36800 | 20667 | N/A | | 44934 | 38000 |
| Relative energy cost % | 100 | 103 | 58 | | | 126 | 107 |
| EQUIPMENT COST | | | | | | | |
| Equipment life (years) | 25 | 20 | 15 | | | 15 | 15 |
| Current equip. replacement cost ($) | 1300 | 800 | 3000 | N/A | | 900 | 1500 |
| 25 - YEAR LIFE CYCLE COST | | | | | | | |
| Estimated system installed cost ($) | 1500 | 2400 | 5400 | | | 2300 | 2800 |
| Service and maintenance cost ($) | 70 | 200 | 1700 | | | 1050 | 1100 |
| Equip. replacement Present Value ($) | 0 | 166 | 1290 | N/A | | 387 | 645 |
| 25 yrs fuel cost Present Value ($) | 8508 | 8795 | 4939 | | | 10739 | 9082 |
| Total 25 - year Life Cycle Cost ($) | 10078 | 11561 | 13330 | | | 14476 | 13627 |
| Relative Life Cycle Cost % | 100 | 115 | 132 | N/A | | 144 | 135 |

* Note: Not Applicable for new constructions.

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# COMPARATIVE LIFE CYCLE COSTING
# FOR RESIDENTIAL ELECTRIC AND OIL SPACE HEATING SYSTEMS

Different heating systems have different operating costs, it is due to the difference in burning efficiency of gas, oil and electricity heating equipment and fuel costs. Therefore, when selecting the most economical heating system for a home, not only the initial installation cost, but also the system operating and maintenance costs should be considered.

There are a number of methods available to arrive at an optimal system selection. One of the most commonly used is the Life Cycle Costing (LCC) technique, which examines the economics (e.g., first cost, operating and maintenance costs, interest rate, etc.) of the heating systems for the duration of the period studied. The most economical selection (or the optimal) would be the one with the lowest life cycle cost.

This data sheet uses the LCC technique to analyze the economics of different oil and electric heating systems for the three typical houses in each of the five regions as indicated in data sheet H338. (Refer to data sheet H340 for analysis of gas/oil space heating systems.)

The analysis is based on the following parameters,

1. Annual fuel escalation rate : Oil - 12%, Electricity - 12%,
2. Annual inflation rate : 5%,
3. Annual interest rate : 10%,
4. Equipment salvage value : 5%,
5. Period of study : 25 years.

The typical houses in data sheet H338 are 110 sq. meter (1200 sq. ft.) single storey dwellings with heated basement and have the following insulation levels,

House A - RSI 1.2 (R7) Ceiling, RSI 1.2 (R7) Walls, RSI 1.2 (R7) Below Grade Walls, Single Glazed Windows (Double Glazed in the Interior and North Coast Regions),

House B - RSI 3.5 (R20) Ceiling, RSI 2.1 (R12) Walls, RSI 2.1 (R12) Below Grade Walls, Double Glazed Windows,

House C - RSI 7.0 (R40) Ceiling, RSI 3.5 (R20) Walls, RSI 2.1 (R12) Below Grade Walls, thermally broken Double Glazed Windows.

## LOCATION : CENTRAL INTERIOR

## HOUSE A - EXISTING HOME WITH TYPICAL PRE-1976 INSULATION

| | Electric Baseboard Heater | Electric Central Furnace | Electric Heat Pump | Oil Furnace W/ Add-On Elec. Plenum Heater | | Conventional Oil Furnace | Intermediate Oil Furnace |
|---|---|---|---|---|---|---|---|
| ENERGY CONSUMPTION | kW.h | kW.h | kW.h | kW.h | Litres | Litres | Litres |
| Annual fuel use | 34663 | 36172 | 20347 | 27129 | 1265 | 6441 | 5450 |
| Equivalent kW.h | 34663 | 36172 | 20347 | 40830 | | 69763 | 59029 |
| 25 - year fuel use (MW.h) | 867 | 904 | 509 | 1021 | | 1744 | 1476 |
| Relative energy consumption % | 100 | 104 | 59 | 118 | | 201 | 170 |
| ENERGY COST | | | | | | | |
| Current annual fuel cost ($) | 1494 | 1559 | 877 | 1620 | | 2295 | 1942 |
| Projected 25 - year fuel cost ($) | 199201 | 207867 | 116934 | 216001 | | 306001 | 258934 |
| Relative energy cost % | 100 | 104 | 59 | 108 | | 154 | 130 |
| EQUIPMENT COST | | | | | | | |
| Equipment life (years) | 25 | 20 | 15 | 15 | | 15 | 15 |
| Current equip. replacement cost ($) | 1700 | 1100 | 3600 | 1600 | | 1400 | 2000 |
| 25 - YEAR LIFE CYCLE COST | | | | | | | |
| Estimated equip. installed cost ($)* | 2500 | 1800 | 4800 | 1600 | | 1400 | 2000 |
| Service and maintenance cost ($) | 70 | 200 | 1700 | 1200 | | 1050 | 1100 |
| Equip. replacement Present Value ($) | 0 | 229 | 1548 | 688 | | 602 | 860 |
| 25 yrs fuel cost Present Value ($) | 47608 | 49679 | 27947 | 51623 | | 73133 | 61884 |
| Total 25 - year Life Cycle Cost ($) | 50178 | 51908 | 35995 | 55111 | | 76185 | 65844 |
| Relative Life Cycle Cost % | 100 | 103 | 72 | 110 | | 152 | 131 |

* Note: Cost indicated is for equip. replacement only, and it includes elect. panel upgrade cost for the full electric systems. The COSP grant is not included in the estiamte. The Electric Plenum Heater is assumed to displace 75% of oil.

## HOUSE B - TYPICAL CURRENT NEW HOME

| | Electric Baseboard Heater | Electric Central Furnace | Electric Heat Pump | Oil Furnace * W/ Add-On Elec. Plenum Heater | | Conventional Oil Furnace | Intermediate Oil Furnace |
|---|---|---|---|---|---|---|---|
| ENERGY CONSUMPTION | kW.h | kW.h | kW.h | kW.h | Litres | Litres | Litres |
| Annual fuel use | 20227 | 21108 | 11873 | 15831 | 707 | 3599 | 3045 |
| Equivalent kW.h | 20227 | 21108 | 11873 | 23489 | | 38981 | 32980 |
| 25 - year fuel use (MW.h) | 506 | 528 | 297 | 587 | | 975 | 825 |
| Relative energy consumption % | 100 | 104 | 59 | 116 | | 193 | 163 |
| ENERGY COST | | | | | | | |
| Current annual fuel cost ($) | 872 | 910 | 512 | 934 | | 1282 | 1085 |
| Projected 25 - year fuel cost ($) | 116267 | 121334 | 68267 | 124534 | | 170934 | 144667 |
| Relative energy cost % | 100 | 104 | 59 | 107 | | 147 | 124 |
| EQUIPMENT COST | | | | | | | |
| Equipment life (years) | 25 | 20 | 15 | 15 | | 15 | 15 |
| Current equip. replacement cost ($) | 1500 | 1000 | 3500 | 1500 | | 1400 | 2000 |
| 25 - YEAR LIFE CYCLE COST | | | | | | | |
| Estimated system installed cost ($) | 1800 | 2600 | 6000 | 1500 | | 2800 | 3400 |
| Service and maintenance cost ($) | 70 | 200 | 1700 | 1200 | | 1050 | 1100 |
| Equip. replacement Present Value ($) | 0 | 208 | 1505 | 645 | | 602 | 860 |
| 25 yrs fuel cost Present Value ($) | 27787 | 28998 | 16315 | 29763 | | 40852 | 34575 |
| Total 25 - year Life Cycle Cost ($) | 29657 | 32006 | 25521 | 33108 | | 45305 | 39935 |
| Relative Life Cycle Cost % | 100 | 108 | 86 | 112 | | 153 | 135 |

* Note: Not a practical option for new constructions, indicated here for Oil Conversion purposes only (75% oil displacement is assumed).

## HOUSE C - CEA DOUBLE E HOME

| | Electric Baseboard Heater | Electric Central Furnace | Electric Heat Pump | Oil Furnace * W/ Add-On Elec. Plenum Heater | | Conventional Oil Furnace | Intermediate Oil Furnace |
|---|---|---|---|---|---|---|---|
| ENERGY CONSUMPTION | kW.h | kW.h | kW.h | kW.h | Litres | Litres | Litres |
| Annual fuel use | 13375 | 13957 | 7851 | | | 2109 | 1785 |
| Equivalent kW.h | 13375 | 13957 | 7851 | N/A | | 22843 | 19333 |
| 25 - year fuel use (MW.h) | 334 | 349 | 196 | | | 571 | 483 |
| Relative energy consumption % | 100 | 104 | 59 | | | 171 | 145 |
| ENERGY COST | | | | | | | |
| Current annual fuel cost ($) | 576 | 602 | 338 | | | 752 | 636 |
| Projected 25 - year fuel cost ($) | 76800 | 80267 | 45067 | N/A | | 100267 | 84800 |
| Relative energy cost % | 100 | 105 | 59 | | | 131 | 110 |
| EQUIPMENT COST | | | | | | | |
| Equipment life (years) | 25 | 20 | 15 | | | 15 | 15 |
| Current equip. replacement cost ($) | 1400 | 900 | 3400 | N/A | | 1300 | 1900 |
| 25 - YEAR LIFE CYCLE COST | | | | | | | |
| Estimated system installed cost ($) | 1700 | 2500 | 5800 | | | 2700 | 3300 |
| Service and maintenance cost ($) | 70 | 200 | 1700 | | | 1050 | 1100 |
| Equip. replacement Present Value ($) | 0 | 187 | 1462 | N/A | | 559 | 817 |
| 25 yrs fuel cost Present Value ($) | 18355 | 19183 | 10771 | | | 23963 | 20267 |
| Total 25 - year Life Cycle Cost ($) | 20125 | 22071 | 19733 | | | 28273 | 25484 |
| Relative Life Cycle Cost % | 100 | 110 | 98 | N/A | | 140 | 127 |

* Note: Not Applicable for new constructions.

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# COMPARATIVE LIFE CYCLE COSTING
# FOR RESIDENTIAL ELECTRIC AND OIL SPACE HEATING SYSTEMS

Different heating systems have different operating costs, it is due to the difference in burning efficiency of gas, oil and electricity heating equipment and fuel costs. Therefore, when selecting the most economical heating system for a home, not only the initial installation cost, but also the system operating and maintenance costs should be considered.

There are a number of methods available to arrive at an optimal system selection. One of the most commonly used is the Life Cycle Costing (LCC) technique, which examines the economics (e.g., first cost, operating and maintenance costs, interest rate, etc.) of the heating systems for the duration of the period studied. The most economical selection (or the optimal) would be the one with the lowest life cycle cost.

This data sheet uses the LCC technique to analyze the economics of different oil and electric heating systems for the three typical houses in each of the five regions as indicated in data sheet H338. (Refer to data sheet H340 for analysis of gas/oil space heating systems.)

The analysis is based on the following parameters,

1. Annual fuel escalation rate : Oil - 12%, Electricity - 12%,
2. Annual inflation rate : 5%,
3. Annual interest rate : 10%,
4. Equipment salvage value : 5%,
5. Period of study : 25 years.

The typical houses in data sheet H338 are 110 sq. meter (1200 sq. ft.) single storey dwellings with heated basement and have the following insulation levels,

House A - RSI 1.2 (R7) Ceiling, RSI 1.2 (R7) Walls, RSI 1.2 (R7) Below Grade Walls, Single Glazed Windows (Double Glazed in the Interior and North Coast Regions),

House B - RSI 3.5 (R20) Ceiling, RSI 2.1 (R12) Walls, RSI 2.1 (R12) Below Grade Walls, Double Glazed Windows,

House C - RSI 7.0 (R40) Ceiling, RSI 3.5 (R20) Walls, RSI 2.1 (R12) Below Grade Walls, thermally broken Double Glazed Windows.

## LOCATION : SOUTHERN INTERIOR

## HOUSE A - EXISTING HOME WITH TYPICAL PRE-1976 INSULATION

| | Electric Baseboard Heater | Electric Central Furnace | Electric Heat Pump | Oil Furnace W/ Add-On Elec. Plenum Heater | | Conventional Oil Furnace | Intermediate Oil Furnace |
|---|---|---|---|---|---|---|---|
| ENERGY CONSUMPTION | kW.h | kW.h | kW.h | kW.h | Litres | Litres | Litres |
| Annual fuel use | 25584 | 27549 | 15496 | 20662 | 980 | 4991 | 4223 |
| Equivalent kW.h | 25584 | 27549 | 15496 | 31276 | | 54058 | 45739 |
| 25 - year fuel use (MW.h) | 640 | 689 | 387 | 782 | | 1351 | 1143 |
| Relative energy consumption % | 100 | 108 | 61 | 122 | | 211 | 179 |
| ENERGY COST | | | | | | | |
| Current annual fuel cost ($) | 1103 | 1187 | 668 | 1232 | | 1734 | 1467 |
| Projected 25 - year fuel cost ($) | 147067 | 158267 | 89067 | 164267 | | 231201 | 195601 |
| Relative energy cost % | 100 | 108 | 61 | 112 | | 157 | 133 |
| EQUIPMENT COST | | | | | | | |
| Equipment life (years) | 25 | 20 | 15 | 15 | | 15 | 15 |
| Current equip. replacement cost ($) | 1700 | 1100 | 3600 | 1600 | | 1300 | 2000 |
| 25 - YEAR LIFE CYCLE COST | | | | | | | |
| Estimated equip. installed cost ($)‡ | 2500 | 1800 | 4800 | 1600 | | 1300 | 2000 |
| Service and maintenance cost ($) | 70 | 200 | 1700 | 1200 | | 1050 | 1100 |
| Equip. replacement Present Value ($) | 0 | 229 | 1548 | 688 | | 559 | 860 |
| 25 yrs fuel cost Present Value ($) | 35148 | 37825 | 21287 | 39259 | | 55256 | 46748 |
| Total 25 - year Life Cycle Cost ($) | 37718 | 40054 | 29335 | 42747 | | 58165 | 50708 |
| Relative Life Cycle Cost % | 100 | 106 | 78 | 113 | | 154 | 134 |

‡ Note: Cost indicated is for equip. replacement only, and it includes elect. panel upgrade cost for the full electric systems. The COSP grant is not included in the estimate. The Electric Plenum Heater is assumed to displace 75% of oil.

## HOUSE B - TYPICAL CURRENT NEW HOME

| | Electric Baseboard Heater | Electric Central Furnace | Electric Heat Pump | Oil Furnace ‡ W/ Add-On Elec. Plenum | Heater | Conventional Oil Furnace | Intermediate Oil Furnace |
|---|---|---|---|---|---|---|---|
| ENERGY CONSUMPTION | kW.h | kW.h | kW.h | kW.h | Litres | Litres | Litres |
| Annual fuel use | 14389 | 15494 | 8715 | 11620 | 523 | 2665 | 2255 |
| Equivalent kW.h | 14389 | 15494 | 8715 | 17285 | | 28865 | 24424 |
| 25 - year fuel use (MW.h) | 360 | 387 | 218 | 432 | | 722 | 611 |
| Relative energy consumption % | 100 | 108 | 61 | 120 | | 201 | 170 |
| ENERGY COST | | | | | | | |
| Current annual fuel cost ($) | 620 | 668 | 376 | 683 | | 926 | 784 |
| Projected 25 - year fuel cost ($) | 82667 | 89067 | 50134 | 91067 | | 123467 | 104534 |
| Relative energy cost % | 100 | 108 | 61 | 110 | | 149 | 126 |
| EQUIPMENT COST | | | | | | | |
| Equipment life (years) | 25 | 20 | 15 | 15 | | 15 | 15 |
| Current equip. replacement cost ($) | 1500 | 1000 | 3500 | 1500 | | 1300 | 2000 |
| 25 - YEAR LIFE CYCLE COST | | | | | | | |
| Estimated system installed cost ($) | 1800 | 2600 | 6000 | 1500 | | 2800 | 3400 |
| Service and maintenance cost ($) | 70 | 200 | 1700 | 1200 | | 1050 | 1100 |
| Equip. replacement Present Value ($) | 0 | 208 | 1505 | 645 | | 559 | 860 |
| 25 yrs fuel cost Present Value ($) | 19757 | 21287 | 11982 | 21765 | | 29508 | 24983 |
| Total 25 - year Life Cycle Cost ($) | 21627 | 24295 | 21187 | 25110 | | 33917 | 30343 |
| Relative Life Cycle Cost % | 100 | 112 | 98 | 116 | | 157 | 140 |

‡ Note: Not a practical option for new constructions, indicated here for Oil Conversion purposes only (75% oil displacement is assumed).

## HOUSE C - CEA DOUBLE E HOME

| | Electric Baseboard Heater | Electric Central Furnace | Electric Heat Pump | Oil Furnace ‡ W/ Add-On Elec. Plenum | Heater | Conventional Oil Furnace | Intermediate Oil Furnace |
|---|---|---|---|---|---|---|---|
| ENERGY CONSUMPTION | kW.h | kW.h | kW.h | kW.h | Litres | Litres | Litres |
| Annual fuel use | 8960 | 9648 | 5427 | | | 1465 | 1239 |
| Equivalent kW.h | 8960 | 9648 | 5427 | N/A | | 15867 | 13420 |
| 25 - year fuel use (MW.h) | 224 | 241 | 136 | | | 397 | 335 |
| Relative energy consumption % | 100 | 108 | 61 | | | 177 | 150 |
| ENERGY COST | | | | | | | |
| Current annual fuel cost ($) | 386 | 416 | 234 | | | 509 | 431 |
| Projected 25 - year fuel cost ($) | 51467 | 55467 | 31200 | N/A | | 67867 | 57467 |
| Relative energy cost % | 100 | 108 | 61 | | | 132 | 112 |
| EQUIPMENT COST | | | | | | | |
| Equipment life (years) | 25 | 20 | 15 | | | 15 | 15 |
| Current equip. replacement cost ($) | 1400 | 900 | 3400 | N/A | | 1200 | 1900 |
| 25 - YEAR LIFE CYCLE COST | | | | | | | |
| Estimated system installed cost ($) | 1700 | 2500 | 5800 | | | 2700 | 3300 |
| Service and maintenance cost ($) | 70 | 200 | 1700 | | | 1050 | 1100 |
| Equip. replacement Present Value ($) | 0 | 187 | 1462 | N/A | | 516 | 817 |
| 25 yrs fuel cost Present Value ($) | 12300 | 13256 | 7457 | | | 16220 | 13734 |
| Total 25 - year Life Cycle Cost ($) | 14070 | 16143 | 16419 | | | 20486 | 18952 |
| Relative Life Cycle Cost % | 100 | 115 | 117 | N/A | | 146 | 135 |

‡ Note: Not Applicable for new constructions.

March 1985: TKWL/HJ

Energy Management Division
B.C. Hydro

# COMPARATIVE LIFE CYCLE COSTING
# FOR RESIDENTIAL ELECTRIC AND OIL SPACE HEATING SYSTEMS

Different heating systems have different operating costs, it is due to the difference in burning efficiency of gas, oil and electricity heating equipment and fuel costs. Therefore, when selecting the most economical heating system for a home, not only the initial installation cost, but also the system operating and maintenance costs should be considered.

There are a number of methods available to arrive at an optimal system selection. One of the most commonly used is the Life Cycle Costing (LCC) technique, which examines the economics (e.g., first cost, operating and maintenance costs, interest rate, etc.) of the heating systems for the duration of the period studied. The most economical selection (or the optimal) would be the one with the lowest life cycle cost.

This data sheet uses the LCC technique to analyze the economics of different oil and electric heating systems for the three typical houses in each of the five regions as indicated in data sheet H338. (Refer to data sheet H340 for analysis of gas/oil space heating systems.)

The analysis is based on the following parameters,

1. Annual fuel escalation rate : Oil - 12%, Electricity - 12%,
2. Annual inflation rate : 5%,
3. Annual interest rate : 10%,
4. Equipment salvage value : 5%,
5. Period of study : 25 years.

The typical houses in data sheet H338 are 110 sq. meter (1200 sq. ft.) single storey dwellings with heated basement and have the following insulation levels,

House A - RSI 1.2 (R7) Ceiling, RSI 1.2 (R7) Walls, RSI 1.2 (R7) Below Grade Walls, Single Glazed Windows (Double Glazed in the Interior and North Coast Regions),

House B - RSI 3.5 (R20) Ceiling, RSI 2.1 (R12) Walls, RSI 2.1 (R12) Below Grade Walls, Double Glazed Windows,

House C - RSI 7.0 (R40) Ceiling, RSI 3.5 (R20) Walls, RSI 2.1 (R12) Below Grade Walls, thermally broken Double Glazed Windows.

**LOCATION : NORTH COAST**

## HOUSE A - EXISTING HOME WITH TYPICAL PRE-1976 INSULATION

| | Electric Baseboard Heater | Electric Central Furnace | Electric Heat Pump | Oil Furnace W/ Add-On Elec. Plenum Heater | | Conventional Oil Furnace | Intermediate Oil Furnace |
|---|---|---|---|---|---|---|---|
| ENERGY CONSUMPTION | kW.h | kW.h | kW.h | kW.h | Litres | Litres | Litres |
| Annual fuel use | 28276 | 29845 | 16788 | 22384 | 1062 | 5407 | 4575 |
| Equivalent kW.h | 28276 | 29845 | 16788 | 33887 | | 58563 | 49552 |
| 25 - year fuel use (MW.h) | 707 | 746 | 420 | 847 | | 1464 | 1239 |
| Relative energy consumption % | 100 | 106 | 59 | 120 | | 207 | 175 |
| ENERGY COST | | | | | | | |
| Current annual fuel cost ($) | 1219 | 1286 | 724 | 1353 | | 1975 | 1671 |
| Projected 25 - year fuel cost ($) | 162534 | 171467 | 96534 | 180401 | | 263334 | 222801 |
| Relative energy cost % | 100 | 105 | 59 | 111 | | 162 | 137 |
| EQUIPMENT COST | | | | | | | |
| Equipment life (years) | 25 | 20 | 15 | 15 | | 15 | 15 |
| Current equip. replacement cost ($) | 1700 | 1100 | 3600 | 1600 | | 1300 | 2000 |
| 25 - YEAR LIFE CYCLE COST | | | | | | | |
| Estimated equip. installed cost ($)* | 2500 | 1800 | 4800 | 1600 | | 1300 | 2000 |
| Service and maintenance cost ($) | 70 | 200 | 1700 | 1200 | | 1050 | 1100 |
| Equip. replacement Present Value ($) | 0 | 229 | 1548 | 688 | | 559 | 860 |
| 25 yrs fuel cost Present Value ($) | 38845 | 40980 | 23071 | 43115 | | 62936 | 53248 |
| Total 25 - year Life Cycle Cost ($) | 41415 | 43209 | 31120 | 46603 | | 65845 | 57209 |
| Relative Life Cycle Cost % | 100 | 104 | 75 | 113 | | 159 | 138 |

* Note: Cost indicated is for equip. replacement only, and it includes elect. panel upgrade cost for the full electric systems. The COSP grant is not included in the estimate. The Electric Plenum Heater is assumed to displace 75% of oil.

## HOUSE B - TYPICAL CURRENT NEW HOME

| | Electric Baseboard Heater | Electric Central Furnace | Electric Heat Pump | Oil Furnace ‡ W/ Add-On Elec. Plenum Heater | | Conventional Oil Furnace | Intermediate Oil Furnace |
|---|---|---|---|---|---|---|---|
| ENERGY CONSUMPTION | kW.h | kW.h | kW.h | kW.h | Litres | Litres | Litres |
| Annual fuel use | 15903 | 16785 | 9442 | 12589 | 567 | 2887 | 2443 |
| Equivalent kW.h | 15903 | 16785 | 9442 | 18730 | | 31269 | 26460 |
| 25 - year fuel use (MW.h) | 398 | 420 | 236 | 468 | | 782 | 662 |
| Relative energy consumption % | 100 | 106 | 59 | 118 | | 197 | 166 |
| ENERGY COST | | | | | | | |
| Current annual fuel cost ($) | 685 | 723 | 407 | 750 | | 1054 | 892 |
| Projected 25 - year fuel cost ($) | 91334 | 96400 | 54267 | 100000 | | 140534 | 118934 |
| Relative energy cost % | 100 | 106 | 59 | 109 | | 154 | 130 |
| EQUIPMENT COST | | | | | | | |
| Equipment life (years) | 25 | 20 | 15 | 15 | | 15 | 15 |
| Current equip. replacement cost ($) | 1500 | 1000 | 3500 | 1500 | | 1300 | 2000 |
| 25 - YEAR LIFE CYCLE COST | | | | | | | |
| Estimated system installed cost ($) | 1800 | 2600 | 6000 | 1500 | | 2800 | 3400 |
| Service and maintenance cost ($) | 70 | 200 | 1700 | 1200 | | 1050 | 1100 |
| Equip. replacement Present Value ($) | 0 | 208 | 1505 | 645 | | 559 | 860 |
| 25 yrs fuel cost Present Value ($) | 21828 | 23039 | 12970 | 23900 | | 33587 | 28425 |
| Total 25 - year Life Cycle Cost ($) | 23698 | 26047 | 22175 | 27245 | | 37996 | 33785 |
| Relative Life Cycle Cost % | 100 | 110 | 94 | 115 | | 160 | 143 |

‡ Note: Not a practical option for new constructions, indicated here for Oil Conversion purposes only (75% oil displacement is assumed).

## HOUSE C - CEA DOUBLE E HOME

| | Electric Baseboard Heater | Electric Central Furnace | Electric Heat Pump | Oil Furnace ‡ W/ Add-On Elec. Plenum Heater | | Conventional Oil Furnace | Intermediate Oil Furnace |
|---|---|---|---|---|---|---|---|
| ENERGY CONSUMPTION | kW.h | kW.h | kW.h | kW.h | Litres | Litres | Litres |
| Annual fuel use | 9903 | 10452 | 5879 | | | 1587 | 1343 |
| Equivalent kW.h | 9903 | 10452 | 5879 | N/A | | 17189 | 14546 |
| 25 - year fuel use (MW.h) | 248 | 261 | 147 | | | 430 | 364 |
| Relative energy consumption % | 100 | 106 | 59 | | | 174 | 147 |
| ENERGY COST | | | | | | | |
| Current annual fuel cost ($) | 427 | 450 | 253 | | | 980 | 490 |
| Projected 25 - year fuel cost ($) | 56934 | 60000 | 33734 | N/A | | 77334 | 65334 |
| Relative energy cost % | 100 | 105 | 59 | | | 136 | 115 |
| EQUIPMENT COST | | | | | | | |
| Equipment life (years) | 25 | 20 | 15 | | | 15 | 15 |
| Current equip. replacement cost ($) | 1400 | 900 | 3400 | N/A | | 1200 | 1900 |
| 25 - YEAR LIFE CYCLE COST | | | | | | | |
| Estimated system installed cost ($) | 1700 | 2500 | 5800 | | | 2700 | 3300 |
| Service and maintenance cost ($) | 70 | 200 | 1700 | | | 1050 | 1100 |
| Equip. replacement Present Value ($) | 0 | 187 | 1462 | N/A | | 516 | 817 |
| 25 yrs fuel cost Present Value ($) | 13607 | 14340 | 8062 | | | 18482 | 15614 |
| Total 25 - year Life Cycle Cost ($) | 15377 | 17227 | 17025 | | | 22749 | 20832 |
| Relative Life Cycle Cost % | 100 | 112 | 111 | N/A | | 148 | 135 |

‡ Note: Not Applicable for new constructions.

March 1985: TKWL/HJ

Energy Management Division
B.C. Hydro

APPENDIX III

SAMPLE OIL-TO-ELECTRIC CONVERSION HEATING ADVICE
(SHOWING PAYBACK PERIODS)

# CONVERSION FROM OIL TO ELECTRIC HEATING ADVICE

For the home of: Typical A-House
Lower Mainland
Electric Heating Option
Report #8301

Dear Sir/Madam:

B.C. Hydro thanks you for taking the time to complete the questionnaire. Based on your input the following has been assumed:

| Reference Location | Style | Shape | # of floors | Roof | Basement | Floor Area | Water Htg Fuel | Year Built |
|---|---|---|---|---|---|---|---|---|
| Vancouver | Detached | Rectangular | One | Pitched | Heated | 1200 sq.ft. | Oil | 1977 |

The following table shows the estimated savings by converting from oil to various electric space heating systems ( 75% oil displacement is assumed for the add-on dual fuel systems ). Savings are based on current fuel prices. Installed costs are approximate for guidance only. Actual cost will depend on your house size, existing equipment type, electrical panel capacity, etc. Paybacks are based on the assumption that fuel cost will escalate at a rate of 2% above inflation.

Oil Consumption Cost Used In The Analysis

Space and Domestic Water Heating - $ 2030 ( 5398 litres ) (See note below)
Allowance for Domestic Water Heating - $ 366 ( 973 litres )
Net Space Heating Consumption - $ 1665 ( 4425 litres )

| Electric Heating System Type | Potential 1st year savings | Without Upgrade Of Elec. Panel: Installed Cost | Without Upgrade Of Elec. Panel: Payback | With Upgrade Of Elec. Panel: Installed Cost | With Upgrade Of Elec. Panel: Payback |
|---|---|---|---|---|---|
| Baseboard Heater | $530 | $1800 | 3 years | $3200 | 6 years |
| Central Forced Warm Air | $360 | $1800 | 5 years | $3000 | 8 years |
| Heat Pump | $840 | $4300 | 5 years | $5500 | 6 years |
| Add-on Electric Plenum Heater | $270 | $1500 | 5 years | N/A | N/A |
| Add-on Heat Pump | $630 | $4000 | 6 years | N/A | N/A |
| Hydronic Central Boiler | $440 | $2000 | 4 years | $3000 | 6 years |
| Electric Dom. Water Heating | $80 | $280 | 3 years | N/A | N/A |

Note: Since you did not supply your oil consumption, the savings indicated above are based on our estimated average.

Additional Recommendations:

- Should you decide to convert to electric space heating, consult with your heating contractors and obtain more than one estimate.
- Your contractor should select the correct heating system size using heat loss calculations based on the actual dimensions and construction of your house as it exists or is planned.
- Electrical space heating system should be installed to the Double E guidelines for comfort and economy.
- Use low voltage thermostats for closer space temperature control and comfort.

For more information, please contact your nearest B.C. Hydro office.

16-May-85
Energy Use Engineering Department

Energy Management Division
B.C. Hydro

# CONVERSION FROM OIL TO ELECTRIC HEATING ADVICE

For the home of: Typical A-House
Prince George
Electric Heating Option
Report #8301

Dear Sir/Madam:

B.C. Hydro thanks you for taking the time to complete the questionnaire. Based on your input the following has been assumed:

| Reference Location | Style | Shape | # of floors | Roof | Basement | Floor Area | Water Htg Fuel | Year Built |
|---|---|---|---|---|---|---|---|---|
| Prince George | Detached | Rectangular | One | Pitched | Heated | 1200 sq.ft. | Oil | 1977 |

The following table shows the estimated savings by converting from oil to various electric space heating systems ( 75% oil displacement is assumed for the add-on dual fuel systems ). Savings are based on current fuel prices. Installed costs are approximate for guidance only. Actual cost will depend on your house size, existing equipment type, electrical panel capacity, etc. Paybacks are based on the assumption that fuel cost will escalate at a rate of 2% above inflation.

Oil Consumption Cost Used In The Analysis

Space and Domestic Water Heating - $ 2874 ( 7424 litres ) (See note below)
Allowance for Domestic Water Heating - $ 377 ( 973 litres )
Net Space Heating Consumption - $ 2498 ( 6451 litres )

| Electric Heating System Type | Potential 1st year savings | Without Upgrade Of Elec. Panel | | With Upgrade Of Elec. Panel | |
|---|---|---|---|---|---|
| | | Installed Cost | Payback | Installed Cost | Payback |
| Baseboard Heater | $840 | $1800 | 2 years | $3200 | 4 years |
| Central Forced Warm Air | $590 | $1800 | 3 years | $3000 | 5 years |
| Heat Pump | $1290 | $4300 | 3 years | $5500 | 4 years |
| Add-on Electric Plenum Heater | $450 | $1500 | 3 years | N/A | N/A |
| Add-on Heat Pump | $970 | $4000 | 4 years | N/A | N/A |
| Hydronic Central Boiler | $720 | $2000 | 3 years | $3000 | 4 years |
| Electric Dom. Water Heating | $100 | $280 | 3 years | N/A | N/A |

Note: Since you did not supply your oil consumption, the savings indicated above are based on our estimated average.

Additional Recommendations:

- Should you decide to convert to electric space heating, consult with your heating contractors and obtain more than one estimate.
- Your contractor should select the correct heating system size using heat loss calculations based on the actual dimensions and construction of your house as it exists or is planned.
- Electrical space heating system should be installed to the Double E guidelines for comfort and economy.
- Use low voltage thermostats for closer space temperature control and comfort.

For more information, please contact your nearest B.C. Hydro office.

16-May-85
Energy Use Engineering Department

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